

This publication was prepared by the NASA Center for AeroSpace Information,
800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934, (301) 621-0390.

INTRODUCTION

This bibliography has been prepared by the NASA Scientific and Technical Information (STI) Program.

USING THE BIBLIOGRAPHY

The first portion of this bibliography contains citations (with abstracts, when available) to unclassified literature contained in the NASA STI Database. These citations also appeared in issues of the abstract journal *Scientific and Technical Aerospace Reports (STAR)*, or in other announcement products offered by the NASA STI Program. The citations appear in ascending accession number order.

A second section provides several indexes to the citations. They are subject term, personal author, report number, and accession number.

AVAILABILITY OF CITED PUBLICATIONS

NASA-sponsored report literature is available to NASA personnel, NASA contractors, and other United States Government agencies and their contractors, through the STI Program, facilitated by the NASA Center for AeroSpace Information. For further information on the availability and cost of any item, contact:

NASA Access Help Desk
NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum, MD 21090-2934
Telephone: (301) 621-0390
Fax: (301) 621-0134
Internet: help@sti.nasa.gov

TABLE OF CONTENTS

AERONAUTICS For related information see also *Astronautics*.

- 01 AERONAUTICS (GENERAL)** N.A.
- 02 AERODYNAMICS** N.A.
Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery. For related information see also 34 *Fluid Mechanics and Heat Transfer*.
- 03 AIR TRANSPORTATION AND SAFETY** N.A.
Includes passenger and cargo air transport operations; and aircraft accidents. For related information see also 16 *Space Transportation* and 85 *Urban Technology and Transportation*.
- 04 AIRCRAFT COMMUNICATIONS AND NAVIGATION** N.A.
Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control. For related information see also 17 *Space Communications, Spacecraft Communications, Command and Tracking* and 32 *Communications and Radar*.
- 05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE** N.A.
Includes aircraft simulation technology. For related information see also 18 *Spacecraft Design, Testing and Performance* and 39 *Structural Mechanics*. For land transportation vehicles see 85 *Urban Technology and Transportation*.
- 06 AIRCRAFT INSTRUMENTATION** N.A.
Includes cockpit and cabin display devices; and flight instruments. For related information see also 19 *Spacecraft Instrumentation* and 35 *Instrumentation and Photography*.
- 07 AIRCRAFT PROPULSION AND POWER** N.A.
Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft. For related information see also 20 *Spacecraft Propulsion and Power*, 28 *Propellants and Fuels*, and 44 *Energy Production and Conversion*.
- 08 AIRCRAFT STABILITY AND CONTROL** N.A.
Includes aircraft handling qualities; piloting; flight controls; and autopilots. For related information see also 05 *Aircraft Design, Testing and Performance*.
- 09 RESEARCH AND SUPPORT FACILITIES (AIR)** N.A.
Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands. For related information see also 14 *Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS For related information see also *Aeronautics*.

- 12 ASTRONAUTICS (GENERAL)** 1
For extraterrestrial exploration see 91 *Lunar and Planetary Exploration*.
- 13 ASTRODYNAMICS** 1
Includes powered and free-flight trajectories; and orbital and launching dynamics.
- 14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)** 2
Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators. For related information see also 09 *Research and Support Facilities (Air)*.
- 15 LAUNCH VEHICLES AND SPACE VEHICLES** N.A.
Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles. For related information see also 20 *Spacecraft Propulsion and Power*.
- 16 SPACE TRANSPORTATION** N.A.
Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques. For related information see also 03 *Air Transportation and Safety* and 18 *Spacecraft Design, Testing and Performance*. For space suits see 54 *Man/System Technology and Life Support*.
- 17 SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING** N.A.
Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout. For related information see also 04 *Aircraft Communications and Navigation* and 32 *Communications and Radar*.

N.A.—No abstracts were assigned to this category for this issue.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 2
Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls. For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance*, *39 Structural Mechanics*, and *16 Space Transportation*.

19 SPACECRAFT INSTRUMENTATION N.A.
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER N.A.
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also *07 Aircraft Propulsion and Power*, *28 Propellants and Fuels*, *44 Energy Production and Conversion*, and *15 Launch Vehicles and Space Vehicles*.

CHEMISTRY AND MATERIALS

23 CHEMISTRY AND MATERIALS (GENERAL) N.A.

24 COMPOSITE MATERIALS N.A.
Includes physical, chemical, and mechanical properties of laminates and other composite materials. For ceramic materials see *27 Nonmetallic Materials*.

25 INORGANIC AND PHYSICAL CHEMISTRY N.A.
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry. For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS N.A.
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS N.A.
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials. For composite materials see *24 Composite Materials*.

28 PROPELLANTS AND FUELS N.A.
Includes rocket propellants, igniters and oxidizers; their storage and handling procedures; and aircraft fuels. For related information see also *07 Aircraft Propulsion and Power*, *20 Spacecraft Propulsion and Power*, and *44 Energy Production and Conversion*.

29 MATERIALS PROCESSING N.A.
Includes space-based development of products and processes for commercial application. For biological materials see *55 Space Biology*.

ENGINEERING For related information see also *Physics*.

31 ENGINEERING (GENERAL) N.A.
Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

32 COMMUNICATIONS AND RADAR 4
Includes radar; land and global communications; communications theory; and optical communications. For related information see also *04 Aircraft Communications and Navigation* and *17 Space Communications, Spacecraft Communications, Command and Tracking*. For search and rescue see *03 Air Transportation and Safety*, and *16 Space Transportation*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING N.A.
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry. For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER N.A.
Includes boundary layers; hydrodynamics; fluidics; mass transfer and ablation cooling. For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 5
Includes remote sensors; measuring instruments and gauges; detectors; cameras and photographic supplies; and holography. For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS N.A.
Includes parametric amplifiers. For related information see also *76 Solid-State Physics*.

37 MECHANICAL ENGINEERING N.A.
Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY N.A.
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS N.A.
Includes structural element design and weight analysis; fatigue; and thermal stress. For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) 5

43 EARTH RESOURCES AND REMOTE SENSING 6
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography. For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION N.A.
Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower. For related information see also *07 Aircraft Propulsion and Power*, *20 Spacecraft Propulsion and Power*, and *28 Propellants and Fuels*.

45 ENVIRONMENT POLLUTION 21
Includes atmospheric, noise, thermal, and water pollution.

46 GEOPHYSICS 42
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 43
Includes weather forecasting and modification.

48 OCEANOGRAPHY 47
Includes biological, dynamic, and physical oceanography; and marine resources. For related information see also *43 Earth Resources and Remote Sensing*.

LIFE SCIENCES

51 LIFE SCIENCES (GENERAL) N.A.

52 AEROSPACE MEDICINE N.A.
Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 BEHAVIORAL SCIENCES 48
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 49
Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also *16 Space Transportation*.

55 SPACE BIOLOGY N.A.
Includes exobiology; planetary biology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE N.A.
Includes hardware for computer graphics, firmware, and data processing. For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 49
Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

62 COMPUTER SYSTEMS N.A.
Includes computer networks and special application computer systems.

- 63 CYBERNETICS** **N.A.**
Includes feedback and control theory, artificial intelligence, robotics and expert systems. For related information see also *54 Man/System Technology and Life Support*.
- 64 NUMERICAL ANALYSIS** **N.A.**
Includes iteration, difference equations, and numerical approximation.
- 65 STATISTICS AND PROBABILITY** **N.A.**
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.
- 66 SYSTEMS ANALYSIS** **50**
Includes mathematical modeling; network analysis; and operations research.
- 67 THEORETICAL MATHEMATICS** **N.A.**
Includes topology and number theory.

PHYSICS For related information see also *Engineering*.

- 70 PHYSICS (GENERAL)** **N.A.**
For precision time and time interval (PTTI) see *35 Instrumentation and Photography*; for geophysics, astrophysics or solar physics see *46 Geophysics*, *90 Astrophysics*, or *92 Solar Physics*.
- 71 ACOUSTICS** **N.A.**
Includes sound generation, transmission, and attenuation. For noise pollution see *45 Environment Pollution*.
- 72 ATOMIC AND MOLECULAR PHYSICS** **N.A.**
Includes atomic structure, electron properties, and molecular spectra.
- 73 NUCLEAR AND HIGH-ENERGY PHYSICS** **N.A.**
Includes elementary and nuclear particles; and reactor theory. For space radiation see *93 Space Radiation*.
- 74 OPTICS** **N.A.**
Includes light phenomena and optical devices. For lasers see *36 Lasers and Masers*.
- 75 PLASMA PHYSICS** **N.A.**
Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.
- 76 SOLID-STATE PHYSICS** **N.A.**
Includes superconductivity. For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.
- 77 THERMODYNAMICS AND STATISTICAL PHYSICS** **N.A.**
Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics. For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

SOCIAL SCIENCES

- 80 SOCIAL SCIENCES (GENERAL)** **N.A.**
Includes educational matters.
- 81 ADMINISTRATION AND MANAGEMENT** **N.A.**
Includes management planning and research.
- 82 DOCUMENTATION AND INFORMATION SCIENCE** **50**
Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography. For computer documentation see *61 Computer Programming and Software*.
- 83 ECONOMICS AND COST ANALYSIS** **N.A.**
Includes cost effectiveness studies.
- 84 LAW, POLITICAL SCIENCE AND SPACE POLICY** **N.A.**
Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.
- 85 URBAN TECHNOLOGY AND TRANSPORTATION** **N.A.**
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation. For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) **N.A.**

89 ASTRONOMY **N.A.**
Includes radio, gamma-ray, and infrared astronomy; and astrometry.

90 ASTROPHYSICS **52**
Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.
For related information see also *75 Plasma Physics*.

91 LUNAR AND PLANETARY EXPLORATION **N.A.**
Includes planetology; and manned and unmanned flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance*.

92 SOLAR PHYSICS **N.A.**
Includes solar activity, solar flares, solar radiation and sunspots. For related information see also *93 Space Radiation*.

93 SPACE RADIATION **N.A.**
Includes cosmic radiation; and inner and outer earth's radiation belts. For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

GENERAL

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs.

99 GENERAL **N.A.**

SUBJECT INDEX..... **A-1**

PERSONAL AUTHOR INDEX **B-1**

REPORT NUMBER INDEX..... **C-1**

ACCESSION NUMBER INDEX **D-1**

APPENDIX **APP-1**

TYPICAL REPORT CITATION AND ABSTRACT

NASA SPONSORED

↓
ON MICROFICHE

ACCESSION NUMBER → N82-21660*# Washington Univ., Saint Louis, MO. Center for Development Technology. ← CORPORATE SOURCE

TITLE → PROGRAM ON STIMULATING OPERATIONAL PRIVATE SECTOR USE OF EARTH OBSERVATION SATELLITE INFORMATION Final Report, 1 Nov. 1979 - 15 Jan. 1981

AUTHORS → L. F. EASTWOOD, JR., J. FOSHAGE, G. GOMEZ, B. KIRKPATRICK, B. KONIG, and R. STEIN, Principal Investigators

PUBLICATION DATE → 15 Jan. 1981 216 p refs

CONTRACT NUMBER → (Contract NASW-3331)

REPORT NUMBERS → (E82-10131; NASA-CR-168515; NAS 1.26:168515) Avail: CASI ← AVAILABILITY AND PRICE CODE
HC A10/MF A03

Ideas for new businesses specializing in using remote sensing and computerized spatial data systems were developed. Each such business serves as an 'information middleman', buying raw satellite or aircraft imagery, processing these data, combining them in a computer system with customer-specific information, and marketing the resulting information products. Examples of the businesses the project designed are: (1) an agricultural facility site evaluation firm; (2) a mass media grocery price and supply analyst and forecaster; (3) a management service for privately held woodlots; (4) a brokerage for insulation and roofing contractors, based on infrared imagery; (5) an expanded real estate information service. In addition, more than twenty-five other commercially attractive ideas in agribusiness, forestry, mining, real estate, urban planning and redevelopment, and consumer information were created. The commercial feasibility of the five business was assessed. This assessment included market surveys, revenue projections, cost analyses, and profitability studies. The results show that there are large and enthusiastic markets willing to pay for the services these businesses offer, and that the businesses could operate profitably. M.G.

REMOTE SENSING / GLOBAL CHANGE

A Special Bibliography

November 1994

12

ASTRONAUTICS (GENERAL)

N85-26834# Joint Publications Research Service, Arlington, VA.
CONTRIBUTION TO SPACE PROGRAM REVIEWED
D. MISHEV *In its East Europe Rept.: Sci. and Technol.*
(JPRS-ESA-84-032) p 3-4 24 Aug. 1984 Transl. into ENGLISH
from Zemedelsko Zname (Sofia), 10 Jul. 1984 p 3
Avail: CASI HC A04/MF A01

The Meteor-Priroda satellite was launched in order to solve a number of problems and tasks related to the remote sensing of the Earth from space. In order to make effective use of the data and images obtained methods and algorithms for multivarious processing by specialized computer systems were developed. The first steps toward solving the problems of spectrum-structural analysis, spectroradiometrical systems, and modeling the operation of an orbitrary system for studying natural resources were made by the Bulgarian 1300-2 project. B.G.

N89-11761*# National Aeronautics and Space Administration, Washington, DC.
CIVIL SPACE TECHNOLOGY INITIATIVE
JUDITH H. AMBRUS *In its Technology for Future NASA Missions: Civil Space Technology Initiative (CSTI) and Pathfinder* p 15-50 Sep. 1988
Avail: CASI HC A03/MF A04

Viewgraphs are presented on earth to orbit propulsion, booster technology, an aeroassist flight experiment, robotics, remote sensing of Earth, and autonomous systems. R.J.F.

N89-11774*# Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.
SENSORS RESEARCH AND TECHNOLOGY
JAMES A. CUTTS *In NASA, Washington, Technology for Future NASA Missions: Civil Space Technology Initiative (CSTI) and Pathfinder* p 283-304 Sep. 1988
Avail: CASI HC A03/MF A04

Information on sensors research and technology is given in viewgraph form. Information is given on sensing techniques for space science, passive remote sensing techniques and applications, submillimeter coherent sensing, submillimeter mixers and local oscillator sources, non-coherent sensors, active remote sensing, solid state laser development, a low vibration cooler, separation of liquid helium and vapor phase in zero gravity, and future plans. R.J.F.

N93-11528*# National Aeronautics and Space Administration, Washington, DC.
PAYLOAD ADVISORY PANEL RECOMMENDATIONS
BERRIEN MOORE, III 8 Nov. 1991 18 p
(NASA-TM-108012; NAS 1.15:108012) Avail: CASI HC A03/MF A01
The Payload Advisory Panel proposes a restructured Earth Observing System (EOS) mission to address high-priority science

and environmental policy issues in Earth System Science. These issues have been identified through studies conducted by the Intergovernmental Panel on Climate Change (IPCC), the United States Environmental Protection Agency (EPA), and the Committee on Earth and Environmental Sciences (CEES). The restructured EOS defers efforts to improve the understanding of the middle and upper stratosphere and solid earth geophysics. The strategy of the mission combines high priority new measurements with continuation of critical data sets begun by missions which precede EOS. Collaborative arrangements with international partners are an essential part of the program and additional arrangements are posed. The need for continuity in Earth observations and the urgency of environmental questions require launch of some EOS elements as soon as possible. They further require maintenance of the EOS objective of obtaining consistent 15-year measurement records.

Author

13

ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbital and launching dynamics.

N92-15466*# National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.
SATELLITE ORBIT CONSIDERATIONS FOR A GLOBAL CHANGE TECHNOLOGY ARCHITECTURE TRADE STUDY
EDWIN F. HARRISON (Lockheed Engineering and Sciences Co., Hampton, VA.), GARY G. GIBSON (Flight Mechanics and Control, Inc., Hampton, VA.), JOHN T. SUTTLES, JAMES J. BUGLIA, and ISRAEL TABACK (Bionetics Corp., Hampton, VA.) *In its Global Change Technology Architecture Trade Study* p 91-108 Sep. 1991 Previously announced as N91-25557
Avail: CASI HC A03/MF A04

A study was conducted to determine satellite orbits for Earth observation missions aimed at obtaining data for assessing global climate change. A multisatellite system is required to meet the scientific requirements for temporal coverage over the globe. The best system consists of four Sun-synchronous satellites equally spaced in local time of equatorial crossing. This system can obtain data every three hours for all regions. Several other satellite systems consisting of combinations of Sun-synchronous orbits and either the Space Station Freedom or a mid-latitude equatorial satellite can provide three to six hour temporal coverage, which is sufficient for measuring many of the parameters required for the global change monitoring mission. Geosynchronous satellites are required to study atmospheric and surface processes involving variations on the order of a few minutes to an hour. Two or more geosynchronous satellites can be relocated in longitude to study processes over selected regions of Earth.

Author

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

14

GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

N91-28079*# Jackson State Univ., MS.

JACKSON STATE UNIVERSITY'S CENTER FOR SPATIAL DATA RESEARCH AND APPLICATIONS: NEW FACILITIES AND NEW PARADIGMS

BRUCE E. DAVIS and GREGORY ELLIOT In Alabama A & M Univ., NASA-HBCU Space Science and Engineering Research Forum Proceedings p 90-95 1989

Avail: CASI HC A02/MF A04

Jackson State University recently established the Center for Spatial Data Research and Applications, a Geographical Information System (GIS) and remote sensing laboratory. Taking advantage of new technologies and new directions in the spatial (geographic) sciences, JSU is building a Center of Excellence in Spatial Data Management. New opportunities for research, applications, and employment are emerging. GIS requires fundamental shifts and new demands in traditional computer science and geographic training. The Center is not merely another computer lab but is one setting the pace in a new applied frontier. GIS and its associated technologies are discussed. The Center's facilities are described. An ARC/INFO GIS runs on a Vax mainframe, with numerous workstations. Image processing packages include ELAS, LIPS, VICAR, and ERDAS. A host of hardware and software peripheral are used in support. Numerous projects are underway, such as the construction of a Gulf of Mexico environmental data base, development of AI in image processing, a land use dynamics study of metropolitan Jackson, and others. A new academic interdisciplinary program in Spatial Data Management is under development, combining courses in Geography and Computer Science. The broad range of JSU's GIS and remote sensing activities is addressed. The impacts on changing paradigms in the university and in the professional world conclude the discussion.

Author

N85-15774*# Engineering and Economics Research, Inc., Vienna, VA.

UPPER ATMOSPHERE RESEARCH SATELLITE (UARS) TRADE ANALYSIS Final Report

M. M. FOX and J. NEBB 30 Nov. 1983 95 p refs (Contract NAS5-26962)

(NASA-CR-175269; NAS 1.26:175269) Avail: CASI HC A05/MF A01

The Upper Atmosphere Research Satellite (UARS) which will collect data pertinent to the Earth's upper atmosphere is described. The collected data will be sent to the central data handling facility (CDHF) via the UARS ground system and the data will be processed and distributed to the remote analysis computer systems (RACS). An overview of the UARS ground system is presented. Three configurations were developed for the CDHF-RACS system. The CDHF configurations are discussed. The IBM CDHF configuration, the UNIVAC CDHF configuration and the vax cluster CDHF configuration are presented. The RACS configurations, the IBM RACS configurations, UNIVAC RACS and VAX RACS are detailed. Due to the large on-line data estimate to approximately 100 GB, a mass storage system is considered essential to the UARS CDHF. Mass storage systems were analyzed and the Braegan ATL, the RCA optical disk, the IBM 3850 and the MASSTOR M860 are discussed. It is determined that the type of mass storage system most suitable to UARS is the automated tape/cartridge device. Two devices of this type, the IBM 3850 and the MASSTOR MSS are analyzed and the applicable tape/cartridge device is incorporated into the three CDHF-RACS configurations.

E.A.K.

18

SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

N84-17248*# Martin Marietta Aerospace, Denver, CO.

TECHNOLOGY NEEDS OF ADVANCED EARTH OBSERVATION SPACECRAFT Final Report

J. J. HERBERT, J. R. POSTUCHOW, and W. A. SCHARTEL Washington NASA Jan. 1984 261 p

(Contract NAS1-16756)

(NASA-CR-3698; NAS 1.26:3698; MCR-81-630) Avail: CASI HC A12/MF A03

Remote sensing missions were synthesized which could contribute significantly to the understanding of global environmental parameters. Instruments capable of sensing important land and sea parameters are combined with a large antenna designed to passively quantify surface emitted radiation at several wavelengths. A conceptual design for this large deployable antenna was developed. All subsystems required to make the antenna an autonomous spacecraft were conceptually designed. The entire package, including necessary orbit transfer propulsion, is folded to package within the Space Transportation System (STS) cargo bay. After separation, the antenna, its integral feed mast, radiometer receivers, power system, and other instruments are automatically deployed and transferred to the operational orbit. The design resulted in an antenna with a major antenna dimension of 120 meters, weighing 7650 kilograms, and operating at an altitude of 700 kilometers.

Author

N91-21216# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

PROPOSED METHODOLOGY FOR THE STUDY OF URBAN ENVIRONMENT AND SPACE STRUCTURE IN METROPOLITAN AREA [PROPOSTA METODOLÓGICA PARA O ESTUDO AMBIENTAL E DA ESTRUTURACAO DO ESPACO URBANO EM AREAS METROPOLITANAS]

CELINA FORESTI Nov. 1990 7 p In PORTUGUESE; ENGLISH summary Presented at the 6th Brazilian Symposium on Remote Sensing, Manaus, Brazil, 24-29 Jun. 1990 (INPE-5203-PRE/1665) Avail: CASI HC A02/MF A01

The second generation satellites can be defined as mapping satellites due to their superior spatial, spectral and radiometric resolutions. Satellite data having these characteristics are useful in urban studies. The integration of data from the Geographic Information System (GIS) with different spatial and spectral resolutions than conventional data from topographic maps and other sources increases the possibility of producing new products that contain detail and precise information about an urban area. Here, a methodology of using remote sensing technology to study the urban environment is proposed. Results of a study carried out in the Sao Paulo metropolitan area are also discussed.

Author

N92-15469*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

SUNSYNCHRONOUS LOW EARTH ORBIT SPACECRAFT CONCEPTS AND TECHNOLOGY REQUIREMENTS FOR GLOBAL CHANGE MONITORING

L. BERNARD GARRETT (Bionetics Corp., Hampton, VA.), **ANSEL J. BUTTERFIELD** (Bionetics Corp., Hampton, VA.), **ISRAEL TABACK** (Bionetics Corp., Hampton, VA.), **PAUL A. GARN**, and **DONALD R. BURROWBRIDGE, JR.** (Spartan Space Services, Glendale, AZ.) In its Global Change Technology Architecture Trade Study p 187-270 Sep. 1991

Avail: CASI HC A05/MF A04

The Global Change Technology Initiative listing of instruments

for operation in low Earth, sunsynchronous orbits contain 21 entries, of which 20 are carried aboard multi-instrument spacecraft. This list identifies the temporal requirements for repetition of measurements and also includes groups of instruments that make complementing measurements. Definitions for individual spacecraft follows the temporal and grouping requirements to establish constellations which will provide the measurement data. The definitions of constellations for multi-instrument spacecraft show two alternatives: a constellation of 10 spacecraft, each compatible with launch by a Delta booster; a constellation of 4 spacecraft, each requiring a Titan booster. Operating subsystems for the individual spacecraft can use modular concepts that are adaptations based upon current plans for improving the performance of the NASA-Goddard Multimission Modular units. The descriptions of the spacecraft and constellations begins with a compilation of instrument related requirements that define the principal system performance parameters and operating capabilities. Author

N92-15470* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
HOOP COLUMN SOIL MOISTURE SPACECRAFT IN LOW EARTH ORBIT FOR GLOBAL CHANGE MONITORING
 MELVIN J. FEREBEE, JR. *In its* Global Change Technology Architecture Trade Study p 271-280 Sep. 1991
 Avail: CASI HC A02/MF A04

A subset of the total Global Change Technology Initiative instruments are required to be in low Earth, sunsynchronous orbits. There is one instrument, however, that requires its own specialized spacecraft; the Soil Moisture Microwave Radiometer (SMMR). The characteristic structure of the instrument is the 118 m hoop column support structure. The hoop is supported by an axially placed column. Tension cables support and shape an electromagnetically reflective mesh surface. The instrument is capable of detecting frequencies in the 1.4 GHz range (Soil Moisture and Sea Salinity). Three apertures are used to reduce the degree of paraboloid offset and improve the beam quality. The spacecraft configuration is determined by the instrument support requirements and the requirement that it can fit into the Titan IV cargo bay. The configuration is derived by cross referencing the instrument performance requirements with the performance of the spacecraft. The spacecraft design is similar with the Multi-mission Modular Spacecraft in terms of size and packaging. A description of the spacecraft's features will yield a summary of the technologies needed for the SMMR spacecraft. Author

N92-15471* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
GEOSTATIONARY ORBIT EARTH SCIENCE PLATFORM CONCEPTS FOR GLOBAL CHANGE MONITORING
 JEFFERY T. FARMER (Bionetics Corp., Hampton, VA.), THOMAS G. CAMPBELL (Bionetics Corp., Hampton, VA.), WILLIAM T. DAVIS (Bionetics Corp., Hampton, VA.), PAUL A. GARN (Bionetics Corp., Hampton, VA.), CHARLES B. KING (Bionetics Corp., Hampton, VA.), and CHERYL C. JACKSON (Flight Mechanics and Control, Inc., Hampton, VA.) *In its* Global Change Technology Architecture Trade Study p 282-291 Sep. 1991
 Avail: CASI HC A02/MF A04

Functionality of a geostationary spacecraft to support Earth science regional process research is identified. Most regional process studies require high spatial and temporal resolution. These high temporal resolutions are on the order of 30 minutes and may be achievable with instruments positioned in a geostationary orbit. A complement of typical existing or near term instruments are identified to take advantage of this altitude. This set of instruments is listed, and the requirements these instruments impose on a spacecraft are discussed. A brief description of the geostationary spacecraft concepts which support these instruments is presented. Author

N92-15472* Bionetics Corp., Hampton, VA.
OPTIONS IN THE GLOBAL CHANGE FLEET ARCHITECTURE

PROVIDED BY THE PRESENCE OF AN EOS-A AND -B
 WARREN D. HYPES and ROGARD T. ROSS (Joint Inst. for Advancement of Flight Sciences, Hampton, VA.) *In* NASA. Langley Research Center, Global Change Technology Architecture Trade Study p 293-308 Sep. 1991
 Avail: CASI HC A03/MF A04

The baseline architecture of the Global Change Technology Initiative (GCTI) fleet was established by selecting and designing spacecraft and instruments to meet the science requirements developed under the task 1 effort. While attempting to meet the temporal sampling portion of the science requirements, no consideration was given to the presence of the proposed Earth Observing System (EOS) Spacecraft that would be making many of the same measurements with many of the same instruments. After establishing the GCTI baseline independent of the EOS Spacecraft; however, it is now prudent to examine the impact of the presence of the EOS Spacecraft on the GCTI fleet. A small scope, GCTI study supplement was accomplished to assess the impact. The content and results of the supplementary study are presented. Author

N92-16009# National Oceanic and Atmospheric Administration, Washington, DC.
PRODUCT DEVELOPMENT PLANS FOR OPERATIONAL SATELLITE PRODUCTS FOR THE NOAA CLIMATE AND GLOBAL CHANGE PROGRAM: SPECIAL REPORT NO. 5
 University Corp. for Atmospheric Research Oct. 1991 83 p
 Avail: CASI HC A05/MF A01

The Product Development Plans (PDP's) developed for the Operational Measurements Project of NOAA's Climate and Global Change Program are presented. The objective of the Operational Measurements Project is to provide continuing climate and global change information products from operational observations. The operational measurement systems, satellite and in situ, generate a continuing stream of observations of the state of the Earth's climate. Author

N92-27388# Mitre Corp., McLean, VA.
SMALL SATELLITES AND RPAS IN GLOBAL-CHANGE RESEARCH, SUMMARY AND CONCLUSIONS
 P. BANKS, J. M. CORNWALL, F. DYSON, N. FORTSON, and S. KOONIN Jan. 1992 29 p
 (AD-A247855; JSR-91-330A) Avail: CASI HC A03/MF A01

JASON has now conducted two studies on the use of small satellites and remotely-piloted aircraft (RPA's) in global change research, with special reference to the DOE Atmospheric Radiation Measurement (ARM) Program and to DARPA's Small Satellite Program. The studies centered around meetings, one in January and the other in June, 1991, to which we invited representatives of all areas of the global change program and of the DOD satellite science and technology community. We have already issued a report on the January study. Here we summarize the main themes and results of our summer study. DTIC

N94-10699* National Aeronautics and Space Administration, Washington, DC.
TOPEX/POSEIDON: A UNITED STATES/FRANCE MISSION. OCEANOGRAPHY FROM SPACE: THE OCEANS AND CLIMATE
 1992 23 p Original contains color illustrations
 (NASA-TM-108253; NAS 1.15:108253) Avail: CASI HC A03/MF A01; 17 functional color pages

The TOPEX/POSEIDON space mission, sponsored by NASA and France's space agency, the Centre National d'Etudes Spatiales (CNES), will give new observations of the Earth from space to gain a quantitative understanding of the role of ocean currents in climate change. Rising atmospheric concentrations of carbon dioxide and other 'greenhouse gases' produced as a result of human activities could generate a global warming, followed by an associated rise in sea level. The satellite will use radar altimetry to measure sea-surface height and will be tracked by three independent systems to yield accurate topographic maps over the dimensions of entire ocean basins. The satellite data, together with the Tropical Ocean

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

and Global Atmosphere (TOGA) program and the World Ocean Circulation Experiment (WOCE) measurements, will be analyzed by an international scientific team. By merging the satellite observations with TOGA and WOCE findings, the scientists will establish the extensive data base needed for the quantitative description and computer modeling of ocean circulation. The ocean models will eventually be coupled with atmospheric models to lay the foundation for predictions of global climate change. Derived from text

N94-14112*# Committee on Earth Observations Satellites, London (England).

MINUTES OF THE SIXTH CEOS PLENARY MEETING

25 Mar. 1993 35 p Meeting held in London, England, 9-11 Dec. 1992

(NASA-TM-108252; NAS 1.15:108252) Avail: CASI HC A03/MF A01

The Committee on Earth Observations Satellites (CEOS) minutes for the sixth plenary meeting held in London, December 9-11, 1992 are presented. Attending as prospective members were the Russian Space Agency (RSA), the Committee for Hydrometeorology and Environmental Monitoring of the Ministry for Ecology and Natural resources of the Russian Federation (ROSCOMGIDROMET), the Chinese Academy of Space Technology (CAST) and the National Remote Sensing Center of China (NRSCC). Actions taken at the meeting included membership issues, CEOS proposals, data policy, and working group reports. Data requirements of CEOS affiliates were also reported on. Additional summations and statements as well as lists of participants and future meetings are included. In general, topics covered related to remote sensing and global change. CASI

32

COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

N84-16412*# Army Cold Regions Research and Engineering Lab., Hanover, NH.

SPACEBORNE SAR AND SEA ICE Status Report

W. F. WEEKS *In* JPL Spaceborne Imaging Radar Symp. p 113-115 1 Jul. 1983

Avail: CASI HC A08/MF A01

A number of remote sensing systems deployed in satellites to view the Earth which are successful in gathering data on the behavior of the world's snow and ice covers are described. Considering sea ice which covers over 10% of the world ocean, systems that have proven capable to collect useful data include those operating in the visible, near-infrared, infrared, and microwave frequency ranges. The microwave systems have the essential advantage in observing the ice under all weather and lighting conditions. Without this capability data are lost during the long polar night and during times of storm passage, periods when ice activity can be intense. The margins of the ice pack, a region of particular interest, is shrouded in cloud between 80 and 90% of the time. E.A.K.

N94-15891*# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (Germany). Inst. fuer Hochfrequenztechnik.

X-SAR: THE X-BAND SYNTHETIC APERTURE RADAR ON BOARD THE SPACE SHUTTLE

MARIAN U. WERNER *In* JPL, Proceedings of the Third Spaceborne Imaging Radar Symposium p 67-73 28 May 1993
Avail: CASI HC A02/MF A04

The X-band synthetic aperture radar (X-SAR) is the German/Italian contribution to the NASA/JPL Shuttle Radar Lab missions as part of the preparation for the Earth Observation System (EOS) program. The Shuttle Radar Lab is a combination of several radars: an L-band (1.2 GHz) and a C-band (5.3 GHz) multipolarization SAR known as SIR-C (Shuttle Imaging Radar); and an X-band (9.6 GHz) vertically polarized SAR which will be operated synchronously over the same target areas to deliver calibrated multifrequency and multipolarization SAR data at multiple incidence angles from space. A joint German/Italian project office at DARA (German Space Agency) is responsible for the management of the X-SAR project. The space hardware has been developed and manufactured under industrial contract by Dornier and Alenia Spazio. Besides supporting all the technical and scientific tasks, DLR, in cooperation with ASI (Agenzia Spaziale Italiano) is responsible for mission operation, calibration, and high precision SAR processing. In addition, DLR developed an airborne X-band SAR to support the experimenters with campaigns to prepare for the missions. The main advantage of adding a shorter wavelength (3 cm) radar to the SIR-C radars is the X-band radar's weaker penetration into vegetation and soil and its high sensitivity to surface roughness and associated phenomena. The performance of each of the three radars is comparable with respect to radiometric and geometric resolution. Author (revised)

N94-15904*# Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.

EOS SAR: A NEW APPROACH

JOBEA WAY *In* its Proceedings of the Third Spaceborne Imaging Radar Symposium p 251-262 28 May 1993

Avail: CASI HC A03/MF A04

Viewgraphs on Earth Observing System (EOS) Synthetic Aperture Radar (SAR) are presented. The goal of the EOS is to develop the modeling and observational capabilities to predict and/or monitor atmospheric, terrestrial, and oceanic processes that are either causing global change or resulting from global change. The EOS SAR goal is to provide important geophysical products to the EOS data set to improve our understanding of the state and functioning of the Earth system. The EOS SAR strategy is to define the instrument requirements based on required input to geophysical algorithms, to provide the processing capability and algorithms to generate such products on the required spatial (global) and temporal (3-5 days) scales, and to provide the spaceborne instrumentation with international partnerships. CASI

N94-23835*# National Space Development Agency, Tokyo (Japan).
NASDA'S VIEW OF GROUND CONTROL IN MISSION OPERATIONS

SATOSHI TATENO *In* JPL, SpaceOps 1992: Proceedings of the Second International Symposium on Ground Data Systems for Space Mission Operations p 15-20 1 Mar. 1993

Avail: CASI HC A02/MF A10

This paper presents an overview of the present status and future plans of the National Space Development Agency of Japan's (NASDA's) ground segment and related space missions. The described ground segment consists of the tracking and data acquisition (T&DA) system and the Earth Observation Center (EOC) system. In addition to these systems, the current plan of the Engineering Support Center (ESC) for the Japanese Experiment Module (JEM) attached to Space Station Freedom is introduced. Then, NASDA's fundamental point of view on the future trend of operations and technologies in the coming new space era is discussed. Within the discussion, the increasing importance of international cooperation is also mentioned. Author (revised)

35

INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

N85-19385# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

BRAZILIAN REMOTE SENSING SHUTTLE EXPERIMENT (BRESEX): CHARACTERISTICS AND FUTURE UTILIZATION ON SATELLITES

N. D. J. PARADA Oct. 1984 11 p Presented at the 18th Intern. Symp. on Remote Sensing of the Environment, Paris, 1-5 Oct. 1984

(INPE-3313-PRE/620) Avail: CASI HC A03/MF A01

Brazilian Space Program plans include the design, manufacturing, launching, operation of four satellites, two of which are designated for the remote sensing of Earth. A cooperative experiment with NASA provides the opportunity to use, in space, a prototype of the imaging instrument designed for these satellites. The objective of the Brazilian Remote Sensing Experiment (BRESEX) to be carried on space shuttle are listed. Specifications for the CCD, pushbroom mode, multispectral band camera are considered.

A.R.H.

N92-15467*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

SELECTION OF REPRESENTATIVE INSTRUMENTS FOR A GLOBAL CHANGE TECHNOLOGY ARCHITECTURE TRADE STUDY

WARREN D. HYPES (Bionetics Corp., Hampton, VA.), LLOYD KEAFER (Bionetics Corp., Hampton, VA.), ROGARD T. ROSS (Joint Inst. for Advancement of Flight Sciences, Hampton, VA.), HEATHER R. KNIGHT (Joint Inst. for Advancement of Flight Sciences, Hampton, VA.), ANTHONY JALINK, and CHERYL L. ALLEN *In its* Global Change Technology Architecture Trade Study p 109-179 Sep. 1991

Avail: CASI HC A04/MF A04

The objectives of Task 2 of the Global Change Technology Initiative (GCTI) Architectural Trade Study were to select representative sets of instruments for making the science measurements specified in Task 1 and to identify instruments that, when flown together, form special complementary packages for measurement purposes. The list of representative instruments and their complementary relationships provide a payload manifest defined in terms of mass, power, size, viewing angles, data rates, etc. which can be used to focus spacecraft trade studies and the definition of a candidate GCTI fleet. Science requirements from Task 1 are given in tabular form. Numerous instruments are described, including visible-infrared radiometers, visible-infrared spectrometers, gas correction radiometers, active systems for Earth observation, limb viewing instruments, visible-infrared and grating spectrometers, and microwave radiometers.

Author

N92-15475*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

PHYSICAL AND PERFORMANCE CHARACTERISTICS OF INSTRUMENTS SELECTED FOR GLOBAL CHANGE MONITORING

CHERYL L. ALLEN *In its* Global Change Technology Architecture Trade Study p 351-379 Sep. 1991

Avail: CASI HC A03/MF A04

The following appendix (appendix B) lists the instruments chosen for the Global Change Monitoring program. The instruments are described according to the following categories: (1) Title; (2) Measurement; (3) Contact; (4) Instrument Type; (5) Dimensions; (6) Mass; (7) Average Operational Power; (8) Data Rate; (9) Spectral/Frequency Range; (10) Number of Channels/Frequencies; (11) Viewing Field; (12) Scanning Characteristics; (13) Resolution (Horizontal/Vertical); (14) Swath Width; (15) Satellite Application; and

(16) Technology Status. A technical drawing of each instrument is also provided.

D.R.D.

N92-29228*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

SIXTEENTH INTERNATIONAL LASER RADAR CONFERENCE, PART 1

M. PATRICK MCCORMICK, ed. Washington Jul. 1992 407 p Conference held in Cambridge, MA, 20-24 Jul. 1992; sponsored by NASA. Langley Research Center, AFOSR, AF Phillips Lab., American Meteorological Society, and the Optical Society of America

(Contract RTOP 665-45-20-21)

(AD-A277077; NASA-CP-3158-PT-1; L-17126-PT-1; NAS 1.55:3158-PT-1) Avail: CASI HC A18/MF A04

This publication contains extended abstracts of papers presented at the 16th International Laser Radar Conference. One-hundred ninety-five papers were presented in both oral and poster sessions. The topics of the conference sessions were: (1) Mt. Pinatubo Volcanic Dust Layer Observations; (2) Global Change/Ozone Measurements; (3) GLOBE/LAWS/LITE; (4) Mesospheric Measurements and Measurement Systems; (5) Middle Atmosphere; (6) Wind Measurements and Measurement Systems; (7) Imaging and Ranging; (8) Water Vapor Measurements; (9) Systems and Facilities; and (10) Laser Devices and Technology. This conference reflects the breadth of research activities being conducted in the lidar field. These abstracts address subjects from lidar-based atmospheric investigations relating to global change to the development of new lidar systems and technology.

N94-16696*# Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.

JPL ACTIVITIES ON DEVELOPMENT OF ACOUSTO-OPTIC TUNABLE FILTER IMAGING SPECTROMETER

LI-JEN CHENG, TIEN-HSIN CHAO, and GEORGE REYES *In its* Summaries of the Third Annual JPL Airborne Geoscience Workshop. Volume 1: AVIRIS Workshop p 88-90 1 Jun. 1992

Avail: CASI HC A01/MF A02

Recent activities of JPL in the development of a new type of imaging spectrometers for earth observation and planetary exploration are reported. This instrument uses the acousto-optic tunable filter (AOTF) as high resolution and fast programmable bandpass filter. AOTF operates in the principle of acousto-optic interaction in an anisotropic medium. This filter can be tuned in sequential, random, and multiwavelength access modes, providing observational flexibility. The diffraction process in the filter generates two diffracted monochromatic beams with polarization orthogonal to each other, creating a unique capability to measure both polarimetric and spectral properties of the incoming light simultaneously with a single instrument. The device gives wide wavelength operations with reasonably large throughput. In addition, it is in a compact solid-state structure without moving parts, providing system reliability. These attractive features give promising opportunities to develop a new generation of airborne/spaceborne and ground, real-time, imaging spectrometer systems for remote sensing applications.

Author (revised)

42

GEOSCIENCES (GENERAL)

N84-30450*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

EARTH OBSERVING SYSTEM. SCIENCE AND MISSION REQUIREMENTS, VOLUME 1, PART 1

Washington Aug. 1984 59 p Original contains color illustrations

42 GEOSCIENCES (GENERAL)

(NASA-TM-86129-VOL-1-PT-1; NAS 1.15:86129-VOL-1-PT-1)
Avail: CASI HC A04/MF A01

The Earth Observing System (EOS) is a planned NASA program, which will carry the multidisciplinary Earth science studies employing a variety of remote sensing techniques in the 1990's, as a prime mission, using the Space Station polar platform. The scientific rationale, recommended observational needs, the broad system configuration and a recommended implementation strategy to achieve the stated mission goals are provided.

N84-30453*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

IMPLEMENTATION STRATEGY

In its Earth Observing System. Sci. and Mission Requirements, Vol. 1, Part 1 p 15-48 Aug. 1983

Avail: CASI HC A04/MF A01

Meeting the identified needs of Earth science requires approaching EOS as an information system and not simply as one or more satellites with instruments. Six elements of strategy are outlined as follows: implementation of the individual discipline missions as currently planned; use of sustained observational capabilities offered by operational satellites without waiting for the launch of new mission; put first priority on the data system; deploy an Advanced Data Collection and Location System; put a substantial new observing capability in a low Earth orbit in such a way as to provide for sustained measurements; and group instruments to exploit their capabilities for synergism; maximize the scientific utility of the mission; and minimize the costs of implementation where possible.

B.G.

N86-31094*# National Aeronautics and Space Administration, Washington, DC.

EARTH OBSERVING SYSTEM. DATA AND INFORMATION SYSTEM. VOLUME 2A: REPORT OF THE EOS DATA PANEL

1986 63 p

(NASA-TM-87777; NAS 1.15:87777) Avail: CASI HC A04/MF A01

The purpose of this report is to provide NASA with a rationale and recommendations for planning, implementing, and operating an Earth Observing System data and information system that can evolve to meet the Earth Observing System's needs in the 1990s. The Earth Observing System (Eos), defined by the Eos Science and Mission Requirements Working Group, consists of a suite of instruments in low Earth orbit acquiring measurements of the Earth's atmosphere, surface, and interior; an information system to support scientific research; and a vigorous program of scientific research, stressing study of global-scale processes that shape and influence the Earth as a system. The Eos data and information system is conceived as a complete research information system that would transcend the traditional mission data system, and include additional capabilities such as maintaining long-term, time-series data bases and providing access by Eos researchers to relevant non-Eos data. The Working Group recommends that the Eos data and information system be initiated now, with existing data, and that the system evolve into one that can meet the intensive research and data needs that will exist when Eos spacecraft are returning data in the 1990s.

Author

N89-22969* National Aeronautics and Space Administration, Washington, DC.

EARTH SYSTEM SCIENCE: A PROGRAM FOR GLOBAL CHANGE

1989 305 p Original document contains color illustrations (NASA-TM-101186; NAS 1.15:101186) Avail: NASA Headquarters, Washington, DC CODE: EE

The Earth System Sciences Committee (ESSC) was appointed to consider directions for the NASA Earth-sciences program, with the following charge: review the science of the Earth as a system of interacting components; recommend an implementation strategy for Earth studies; and define the role of NASA in such a program. The

challenge to the Earth system science is to develop the capability to predict those changes that will occur in the next decade to century, both naturally and in response to human activity. Sustained, long-term measurements of global variables; fundamental descriptions of the Earth and its history; research foci and process studies; development of Earth system models; an information system for Earth system science; coordination of Federal agencies; and international cooperation are examined.

B.G.

N91-24669*# National Aeronautics and Space Administration, Washington, DC.

THE HIGHLIGHTS OF 1989

1989 77 p

(NASA-TM-104985; NAS 1.15:104985) Avail: CASI HC A05/MF A01

Activity of the Earth Science and Application Division in 1989 is reported. An overview of the work of Division is presented, and the main changes in previously announced flight schedules are noted. The following subject areas are covered: the Earth Observing System; studies of the stratospheric ozone; U.S.-U.S.S.R. collaboration in Earth sciences; cloud climatology and the radiation budget; studies of ocean color; global tropospheric chemistry studies; first ISLSCP (International Satellite Cloud Climatology Project) field experiment; and solid Earth science research plan.

Author

N81-76526 Joint Publications Research Service, Arlington, VA.

EARTH SCIENCES FROM SPACE

A. V. SIDORENKO *In its USSR Rept.: Space, No. 11 (JPRS-78264) p 56-62 10 Jun. 1981 Transl. into ENGLISH from Priroda (Moscow), no. 11, Nov. 1980 p 3-9*

43

EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

N82-15497# Committee on Science and Technology (U.S. House). CIVIL LAND REMOTE SENSING SYSTEMS

Washington GPO 1981 370 p Joint hearings before the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol. and the Subcomm. on Sci., Technol., and Space of the Comm. on Com., Sci., and Transportation, 97th Congr., 1st Sess., No. 40, 22-23 Jul. 1981

(GPO-35-265) Avail: Subcommittee on Space Science and Applications

Steps taken to facilitate NOAA assumption of responsibility for operating LANDSAT D and LANDSAT D prime are reviewed and institutional alternatives for transferring operational responsibility for the program to the private sector are examined. These include: (1) an existing private corporation; (2) a legislatively established for profit private corporation; (3) a government corporation; and (4) Federal agency ownership with private sector operation. The advantages and disadvantages of each of these options are considered as well as user participation.

A.R.H.

N82-17562*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

CHARACTERIZING USER REQUIREMENTS FOR FUTURE LAND OBSERVING SATELLITES

J. L. BARKER, P. J. CRESSY, C. C. SCHNETZLER, and V. V. SALOMONSON Dec. 1981 56 p refs

(NASA-TM-83867) Avail: CASI HC A04/MF A01

The objective procedure was developed for identifying probable sensor and mission characteristics for an operational satellite land observing system. Requirements were systematically compiled, quantified and scored by type of use, from surveys of federal, state, local and private communities. Incremental percent increases

in expected value of data were estimated for critical system improvements. Comparisons with costs permitted selection of a probable sensor system, from a set of 11 options, with the following characteristics: 30 meter spatial resolution in 5 bands and 15 meters in 1 band, spectral bands nominally at Thematic Mapper (TM) bands 1 through 6 positions, and 2 day data turn around for receipt of imagery. Improvements are suggested for both the form of questions and the procedures for analysis of future surveys in order to provide a more quantitatively precise definition of sensor and mission requirements. A.R.H.

N82-21660* Washington Univ., Saint Louis, MO. Center for Development Technology.

PROGRAM ON STIMULATING OPERATIONAL PRIVATE SECTOR USE OF EARTH OBSERVATION SATELLITE INFORMATION Final Report, 1 Nov. 1979 - 15 Jan. 1981

L. F. EASTWOOD, JR., J. FOSHAGE, G. GOMEZ, B. KIRKPATRICK, B. KONIG, and R. STEIN, Principal Investigators
15 Jan. 1981 216 p refs
(Contract NASW-3331)

(E82-10131; NASA-CR-168515; NAS 1.26:168515) Avail: CASI HC A10/MF A03

Ideas for new businesses specializing in using remote sensing and computerized spatial data systems were developed. Each such business serves as an 'information middleman', buying raw satellite or aircraft imagery, processing these data, combining them in a computer system with customer-specific information, and marketing the resulting information products. Examples of the businesses the project designed are: (1) an agricultural facility site evaluation firm; (2) a mass media grocery price and supply analyst and forecaster; (3) a management service for privately held woodlots; (4) a brokerage for insulation and roofing contractors, based on infrared imagery; (5) an expanded real estate information service. In addition, more than twenty-five other commercially attractive ideas in agribusiness, forestry, mining, real estate, urban planning and redevelopment, and consumer information were created. The commercial feasibility of the five business was assessed. This assessment included market surveys, revenue projections, cost analyses, and profitability studies. The results show that there are large and enthusiastic markets willing to pay for the services these businesses offer, and that the businesses could operate profitably. M.G.

N82-22630# Committee on Science and Technology (U.S. House). CIVIL LAND REMOTE SENSING SYSTEM

Washington GPO 1982 77 p Presented by the Subcom. on Space Sci. and Appl. of the Comm. on Sci. and Technol., 97th Congr., 1st Sess., Dec. 1981

(GPO-87-070) Avail: Subcommittee on Space Science and Applications

Current remote sensing research and development activities, current planning for an operational system, and international remote sensing activities are summarized. Significant issues considered include: the role of government vis-a-vis the private sector, the way in which it can best serve both the public and the private sector, its role in future research and development, and regulations and terms it must mandate for a civil land remote sensing system. Legislation needed for government/industry joint ventures is also examined.

A.R.H.

N83-10471* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

APPENDIX C. LANDSAT: A WORLDWIDE PERSPECTIVE

In *Its The LANDSAT Tutorial Workbook* p 455-475 1982 refs
Avail: CASI HC A03/MF A04; SOD HC; 12 functional color pages

Images characteristics of geographic regions other than the northeastern part of the United States are presented for interpretation. Pre- and post-eruption imagery of Mt. St. Helens volcano serves to demonstrate the advantages of thermal infrared sensing, and the potential for developing a timely, decision oriented thematic map to be used in solving drought-related problems in Upper Volta

is examined to show the applicability of satellite remote sensing in all geographic areas. A.R.H.

N83-12508# Ministere de l'Energie et des Ressources (Quebec). CONFERENCE ON USING NEXT GENERATION EARTH OBSERVATION SATELLITES: SUMMARY HANDBOOK [COLLOQUE SUR L'UTILISATION DE LA PROCHAINE GENERATION DE SATELLITES D'OBSERVATION DE LA TERRE: MANUEL DE SYNTHESE]

H. AUDET, ed. and K. P. B. THOMSON, ed. (Centre Canadien de Teledetection) 1981 79 p In FRENCH and ENGLISH Conf. held in Montreal, 24-25 Mar. 1981 refs

Avail: CASI HC A05/MF A01

Presentations and discussions of the different techniques needed to process the data to be provided by the high resolution visible sensor on SPOT and the thematic mapper on LANDSAT D are highlighted. Experiments conducted to simulate data from these two instruments are described and results, conclusions, and recommendations from each effort are summarized. Transl. by A.R.H.

N83-17988* National Aeronautics and Space Administration, Washington, DC.

STATUS AND OUTLOOK FOR NASA'S LAND REMOTE SENSING PROGRAM

R. H. WEINSTEIN In *Purdue Univ. CORSE-81: The 1981 Conf. on Remote Sensing Educ.* p 341-342 1981

Avail: CASI HC A16/MF A03

Both LANDSAT 2 and LANDSAT 3 are currently in operational status following recovery from technical problems. The LANDSAT D program continues NASA's R&D with the dual objectives of assessing the capabilities of the thematic mapper sensor and evaluating the requirements for an operational land observing system. LANDSAT D' will not be launched until LANDSAT D ceases operation, to provide data continuity through 1988. Future NASA remote sensing programs will continue to emphasize research, technology development, cooperative projects with end users of data and cooperation with the National Oceanic and Atmospheric Administration (NOAA) on transition to an operational land observing system. Technology development should extend the results of research to practical applications through improved ground data processing and information extraction techniques and development of new sensors such as the solid state multi-spectral linear array. A.R.H.

N83-19141* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

SECOND EASTERN REGIONAL REMOTE SENSING APPLICATIONS CONFERENCE

M. L. IMHOFF, ed., R. G. WITT, ed., and D. KUGELMANN, ed. 1981 398 p Conf. held in Danvers, Mass., 9-11 Mar. 1981 refs (E83-10189; NASA-CP-2198; NAS 1.55:2198) Avail: CASI HC A17/MF A04

Participants from state and local governments share experiences in remote sensing applications with one another and with users in the Federal government, universities, and the private sector during technical sessions and forums covering agriculture and forestry; land cover analysis and planning; surface mining and energy; data processing; water quality and the coastal zone; geographic information systems; and user development programs.

N83-35466* General Electric Co., Philadelphia, PA. Space Systems Operation.

NAVAL REMOTE OCEAN SENSING SYSTEM (NROSS) STUDY Final Report

May 1983 183 p Prepared for JPL, Pasadena, Calif.

(Contract NAS7-100; JPL-956524)

(NASA-CR-173109; JPL-9950-858; NAS 1.26:173109; DOC-83SDS4223) Avail: CASI HC A09/MF A02

A set of hardware similar to the SEASAT A configuration requirement, suitable for installation and operation aboard a NOAA-D bus and a budgetary cost for one (1) protoflight model was

43 EARTH RESOURCES AND REMOTE SENSING

provided. The scatterometer sensor is conceived as one of several sensors for the Navy Remote Ocean Sensing System (NROSS) Satellite Program. Deliverables requested were to include a final report with appropriate sketches and block diagrams showing the scatterometer design/configuration and a budgetary cost for all labor and materials to design, fabricate, test, and integrate this hardware into a NOAA-D satellite bus. This configuration consists of two (2) hardware assemblies - a transmitter/receiver (T/R) assembly and an integrated electronics assembly (IEA). The T/R assembly as conceived is best located at the extreme opposite end of the satellite away from the solar array assembly and oriented in position to enable one surface of the assembly to have unobstructed exposure to space. The IEA is planned to be located at the bottom (Earth viewing) side of the satellite and requires a radiating plate. S.L.

N84-17676# Autometric Corp., Inc., Falls Church, VA.
APPS-4 (ANALYTICAL PHOTOGRAMMETRIC PROCESSING SYSTEM-4) REMOTE SENSING APPLICATIONS GUIDE
J. D. PEROUTKY Fort Belvoir, Va. Army Engineer Topographic Labs. Jun. 1983 86 p
(Contract DAAK70-81-C-0261)
(AD-A134977; REPT-901-0081; ETL-0333) Avail: CASI HC A05/MF A01

This report describes the Computer-Assisted Photo Interpretation Research (CAPIR) facility at the U.S. Army Engineer Topographic Laboratories (USAETL) and discusses its use, primarily with the APPS-IV analytical stereoplotter, for various remote sensing applications. The components of the APPS-IV and the geographic information system (AUTOGIS) are described, followed by discussions of the capabilities and advantages of a CAPIR-type system. A general workflow is also included as a guide to the undertaking of this type project. DTIC

N84-31238# Joint Publications Research Service, Arlington, VA.
AZERBAIJAN INSTITUTE DEVELOPS SUBSATELLITE MEASUREMENT SYSTEMS
T. ISMAILOV *In its USSR Rept.: Space (JPRS-USP-84-004)* p 133-136 22 Aug. 1984 Transl. into ENGLISH from Pravda (Moscow), 27 Mar. 1984 p 3
Copyright Avail: CASI HC A07

The subsatellite automatic data measuring system is used in aerial and satellite control-measurement areas. The system was designed for reception, preprocessing of data (in a search or operational mode) and the change from occasional to systematic measurements of various parameters of natural objects. Author

N84-35050# National Taiwan Univ., Taipei.
PRELIMINARY STUDY OF LANDSAT IMAGERIES OF TAIWAN AND ITS SURROUNDINGS Abstract Only
Y. A. FAN *In National Science Council Sci. Res. Abstr. in Republic of China*, 1983 p 56 Jun. 1984
Avail: Issuing Activity

A collection of LANDSAT imageries of Taiwan and its surroundings is presented. The coastal water depth is measured using the LANDSAT 3 MSS imageries. Imagery interpretation methods and techniques include film density measurement. The LANDSAT coverage is divided into sub-regions for detailed investigation, using a color densitometer and a scanning microdensitometer. A Correlation analysis is performed. A grid system for density measurement of LANDSAT imageries for the seas around Taiwan is presented. Depth of coastal water in selected study areas down to 30 meters below sea level is determined. The coastal water depth profiles and sea state image interpretation are also described. M.A.C.

N85-20776# Centre National d'Etudes Spatiales, Paris (France). Applications Program Division
THE SPOT OPERATIONAL REMOTE SENSING SATELLITE SYSTEM: CURRENT STATUS AND PERSPECTIVES
G. BRACHET *In AGARD Space System Applications to Tactical Operations* 13 p Oct. 1984
Avail: CASI HC A09/MF A02

The SPOT program, comprising Earth observation satellites and ground receiving stations is discussed. The first satellite, due for launch in 1985, will carry a payload of two identical high resolution visible instruments using CCD linear arrays technology. These will make images of the Earth with sampling step of 20 meters in three color bands in the visible range and in the near infrared, and with a sampling step of 10 meters in a broad, panchromatic band: i.e., in black and white. This configuration is suitable for observing the small agricultural plots found in many countries. It also satisfies some conventional cartographic requirements. Sidelooking capability will allow the satellite to observe any region of the Earth at intervals of one to several days, thus allowing relatively fast changing phenomena to be monitored. It will also be possible to provide for stereoscopic vision by associating views taken from different angles. R.J.F.

N85-20777# Dornier-Werke G.m.b.H., Friedrichshafen (Germany).
THE ESA REMOTE SENSING SATELLITE SYSTEM (ERS-1)
E. H. VELTON *In AGARD Space System Applications to Tactical Operations* 11 p Oct. 1984 refs
Avail: CASI HC A09/MF A02

The ERS-1 remote sensing system is presently in the definition phase. The system development will start in early 1984, launch of the first satellite is planned for mid 1988 from Guyana Space Centre by the European launcher ARIANE. The ERS-1 system development will be performed jointly by the member states of the European Space Agency together with Norway and Canada. Mission objectives, system elements, instruments, data processing, and ground support are discussed. R.J.F.

N85-23224*# National Aeronautics and Space Administration, Washington, DC.
NASA'S LAND REMOTE SENSING PLANS FOR THE 1980'S
H. C. HIGG, K. M. BUTERA, and M. SETTLE *In NASA Goddard Space Flight Center Remote Sensing of Snow and Evapotranspiration* p 1-5 Feb. 1985
Avail: CASI HC A09/MF A01

Research since the launch of LANDSAT-1 has been primarily directed to the development of analysis techniques and to the conduct of applications studies designed to address resource information needs in the United States and in many other countries. The current measurement capabilities represented by MSS, TM, and SIR-A and B, coupled with the present level of remote sensing understanding and the state of knowledge in the discipline earth sciences, form the foundation for NASA's Land Processes Program. Science issues to be systematically addressed include: energy balance, hydrologic cycle, biogeochemical cycles, biological productivity, rock cycle, landscape development, geological and botanical associations, and land surface inventory, monitoring, and modeling. A global perspective is required for using remote sensing technology for problem solving or applications context. A successful model for this kind of activity involves joint research with a user entity where the user provides a test site and ground truth and NASA provides the remote sensing techniques to be tested. A.R.H.

N85-25358# Joint Publications Research Service, Arlington, VA.
DETERMINING CHARACTERISTICS OF OPTICAL RADIATION REFLECTORS BASED ON RESULTS OF REMOTE SENSING Abstract Only
I. F. PISAREVSKIY *In its USSR Rept.: Space (JPRS-USP-85-003)* p 120-121 4 Mar. 1985 Transl. into ENGLISH from Izv. Vysshikh Uch. Zaved.: Geod. i Aerofototsyemka (USSR), no. 4, Jul.-Aug. 1984 p 93-98
Avail: CASI HC A08/MF A02

The planning of spacecraft remote sensing systems for studies of the Earth requires the study of the reflective characteristics of natural objects. The problem arises of developing methods of determining informative parameters of objects. This formula is simplified if the characteristic experiment recorded is a measure of the directional properties of reflectors. The directionality coefficient

of the reflector was studied. It is determined by recording the back reflection index of an object. A spacecraft flying past a reflector illuminates it with laser radiation from a continuously changing angle. An algorithm is presented for estimating the absorbing properties of obstacles and determining the back reflection of the reflector. The results of experimental measurements determine the parameters of surface unevenness. E.A.K.

N85-26820# Joint Publications Research Service, Arlington, VA.
TENTH CONFERENCE OF WORKING GROUP OF SOCIALIST COUNTRIES ON REMOTE SENSING OF EARTH UNDER INTERCOSMOS PROGRAM Abstract Only

V. V. YEGOROV *In its USSR Rept.: Space (JPRS-USP-85-004) p 81 6 May 1985 Transl. into ENGLISH from Issled. Zemli iz Kosmosa (Moscow), no. 6, Nov. - Dec. 1984 p 111-113 Conf. held in Ulan-Bator, USSR, 26 Jun. - 2 Jul. 1984*
 Avail: CASI HC A06

Work on remote sensing of the Earth (WGRS) and the research planned for 1986-1990 was discussed. The first stage of the Black Sea experiment was carried out in August-September 1983. Data on hydrophysical, biological and optical parameters of the sea surface were collected from the Soyuz-7 and Meteor-Priroda satellites, and AN-30 flying laboratory. Spectral and multilevel photographic and biogeophysical measurements were made of soil-vegetation complexes. Surface spectrometric measurements of natural pasture vegetation in Mongolia were supplemented by a photographic survey from the Salyut-7. A report on the Gobi-Khangay-81 experiment was presented. Preparations for a multilingual terminological-interpretive dictionary of remote sensing terms are being completed. Four main themes are emphasized: study of geosystems by remote methods; study of world ocean and closed water bodies with allowance for influence of atmosphere; study of geological structures by remote methods; improvement of methods and instrumentation for remote measurements and processing of results. Methods for remote sensing in geological research was discussed. E.A.K.

N85-32384*# National Aeronautics and Space Administration.
 Goddard Space Flight Center, Greenbelt, MD.

PROCESS THRESHOLDS: REPORT OF WORKING GROUP NUMBER 3

R. S. WILLIAMS, JR. (Geological Survey, Reston, Va.) *In its Global Mega-Geomorphology p 106-108 Jul. 1985*
 Avail: CASI HC A07/MF A01

The Process Thresholds Working Group concerned itself with whether a geomorphic process to be monitored on satellite imagery must be global, regional, or local in its effect on the landscape. It was pointed out that major changes in types and magnitudes of processes operating in an area are needed to be detectable on a global scale. It was concluded from a review of geomorphic studies which used satellite images that they do record change in landscape over time (on a time-lapse basis) as a result of one or more processes. In fact, this may be one of the most important attributes of space imagery, in that one can document land form changes in the form of a permanent historical record. The group also discussed the important subject of the acquisition of basic data sets by different satellite imaging systems. Geomorphologists already have available one near-global basis data set resulting from the early LANDSAT program, especially images acquired by LANDSATs 1 and 2. Such historic basic data sets can serve as a benchmark for comparison with landscape changes that take place in the future. They can also serve as a benchmark for comparison with landscape changes that have occurred in the past (as recorded) by images, photography and maps. R.J.F.

N85-33130# Joint Publications Research Service, Arlington, VA.
COSMONAUTS PARTICIPATE IN MULTILEVEL REMOTE SENSING EXPERIMENT Abstract Only

N. BARSKIY *In its USSR Rept.: Space (JPRS-USP-84-006) p 23 14 Nov. 1984 Transl. into ENGLISH from Bakinskiy Rabochiy (Maku), 30 Aug. 1984 p 3*

Avail: CASI HC A08

An international experiment was conducted for the study of natural resources by remote methods. Photography and spectrometry of the republic's territory from orbit and the spectral characteristics of natural objects in the Sheki and Zakataly rayons and at the Mingechaur Reservoir were recorded. The aerospace experiment was conducted at several levels, ranging from equipment in orbit and instruments on board airplanes and helicopters, to a ground-based automated information-and-measurement complex. The purpose of the project is to develop scientific-methodological and physical-technical bases of environmental studies from space. The information will provide farmers with recommendations, maps and charts for the rational use of agricultural lands, pastures and reservoirs based on study of mountain-meadow, forest and valley geosystems. The materials obtained from the manned complex, correlated with data from aerial photography and ground-based observations. E.A.K.

N86-14181# Joint Publications Research Service, Arlington, VA.
METHODS FOR COMPLEX SPACE EXPERIMENT IN USSR FOR STUDYING LAND FROM MANNED SPACECRAFT Abstract Only

B. V. VINOGRADOV *In its USSR Rept.: Space (JPRS-USP-85-005) p 118 30 Sep. 1985 Transl. into ENGLISH from Issled. Zemli iz Kosmosa (Moscow), no. 5, Sep. - Oct. 1984 p 100-106 Original language document announced in IAA as A85-16946*
 Avail: CASI HC A08

A combined space experiment involves use of surface, aerial and space vehicles and instrumentation. The implementation of such an experiment requires adherence to a number of rules relating to the comparability of data: temporal, spectral and spatial. In the USSR such experiments have become increasingly complex and have proceeded through the following states: (1) study of space survey transfer function (geophysical experiment in 1969-Ustyurt Plateau); (2) study of reliability and detail of recognition of natural features from space photographs (informational experiment in 1970-Salsk steppes); (3) study of effectiveness of special mapping, revision of existing maps and compilation of new types of maps (mapping experiment in 1971-Altay and Balkhash key sectors); (4) study of dynamics of natural and anthropogenic systems by successive surveys for registry and prediction of changes (dynamic experiment in 1978-Salsk key sector); and (5) study of rhythmic change in natural systems for registry of short-period changes, their prediction and choice of optimum survey conditions (phenological experiment in 1981-Kyzylkum key sector). Author

N86-14184# Joint Publications Research Service, Arlington, VA.
ROLE OF LANDSCAPE RESEARCH IN DEVELOPMENT OF SPACE METHODS FOR STUDYING EARTH Abstract Only

Y. V. GLUSHKO *In its USSR Rept.: Space (JPRS-USP-85-005) p 121 30 Sep. 1985 Transl. into ENGLISH from Issled. Zemli iz Kosmosa (Moscow), no. 5, Sep. - Oct. 1984 p 115-121*
 Avail: CASI HC A08

This is an overview of the contributions which space surveys are making to the development of the Earth sciences, with emphasis on landscape (geographical-environmental) research. Space methods are sweeping traditional methods away or are reducing them to a secondary role. Attention is given to 23 branches of the earth sciences with 82 key problems considered which can be investigated by remote sensing methods. The advantages of remote sensing in study of the atmosphere, hydrosphere, biosphere, sociosphere and in landscape geography are discussed. A table gives a detailed listing of the scientific, practical and economic problems which can be solved by space methods. References are made to the monographs, brochures, transactions, collections of articles and individual articles which give the best information concerning different aspects of these problems. Space methods have already served as a basis for a number of fundamental landscape investigations at a regional level. The landscape research method is now also being used in study of the geographical zonality of the world ocean. Author

43 EARTH RESOURCES AND REMOTE SENSING

N86-16696# Committee on Science and Technology (U.S. House). **LANDSAT COMMERCIALIZATION** Washington GPO 1985 84 p Hearing before the Comm. on Sci. and Technol., 99th Congr., 1st Sess., No. 30, 13 Jun. 1985 (GPO-49-336)

Avail: Subcommittee on Natural Resources, Agriculture Research and Environment and Subcommittee on Space Science and Applications

Hearings were held in the U.S. House of Representatives by the Subcommittee on Natural Resources, Agriculture Research and Environment, and the Subcommittee on Space Science and application on the commercialization of the LANDSAT Program. The goal was to establish a commercial U.S. civil operation land-observing satellite program. E.A.K.

N86-17815*# Murray State Univ., KY. Mid-America Remote Sensing Center.

DETERMINATION OF THE UTILITY OF REMOTE SENSING DATA FOR LAND USE/COVER ANALYSIS IN THE LOWER APPALACHIA REGION: ASSESSING THE UTILITY OF REMOTE SENSING DATA FOR ARCHEOLOGICAL SITE RECOGNITION Final Report

N. V. WEBER 15 Aug. 1983 48 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (Contract NAS13-200) (E86-10021; NASA-CR-176435; NAS 1.26:176435) Avail: CASI HC A03/MF A01

Thematic Mapper Simulator (TMS) data were gathered by NASA/ERL over a portion of the lower Ohio River and the middle Mississippi River valleys on April 11, 1982. CIR imagery accompanied the 10 and 30 meter resolution TMS data sets. This area is somewhat unique archeologically as there exists a concentration of sites with major features such as mounds, earthworks, and villages. It was the primary purpose of this study to determine the utility of TMS data in identifying signatures which are distinctly archeological. TMS data were processed using the NASA/ERL software package ELAS. No signatures that were distinctly archeological were detected, due in large part to the complexity of the land cover and land use practices. However, as more sophisticated classification techniques were employed, the classes which were related to archeological features were narrowed. TMS data could certainly be of assistance to a trained archeologist/interpreter in narrowing an area which has to be field-surveyed as anomalous features can be recognized within a particular environmental context. Author

N86-20260# Joint Publications Research Service, Arlington, VA. **USE OF A PRIORI EVALUATION OF CONDITIONS FOR OBSERVING EARTH'S SURFACE FROM SPACE FOR EFFECTIVE CHOICE OF TIME FOR EXECUTING SURVEY** Abstract Only

N. V. KAPITONOVA and Y. L. LUKASHEVICH *In its* USSR Report: Space (JPRS-USP-86-001) p 155 13 Jan. 1986 Transl. into ENGLISH from Issledovaniye Zemli iz Kosmosa (Moscow, USSR), no. 1, Jan. - Feb. 1985 p 113-117 Original language document was announced in IAA as A85-29914 Avail: CASI HC A01

Adequate study has been made of the motion of space vehicles for studying the Earth's natural resources, such as the nominal parameters of their working orbits, but a weak link which remains is the uncertainty in choice of the initial orientation of the orbital plane relative to the direction to the Sun. This orientation is determined by the angle $\tau = \alpha - \omega$, where α is the right ascension of the Sun on the initial date of the survey, ω is the longitude of the ascending node of the space vehicle orbit, unambiguously related to the illumination conditions for the Earth's surface along the flight trajectory. A method has been developed for determining a rational ω value which would make possible the most complete satis-

faction of requirements on solar altitude in surveys of different regions, taking their meteorological and climatic characteristics into account. For this purpose the Earth's surface, which is to be photographed from a circular orbit from a satellite with a specific inclination, is broken down into regions with characteristic climatic conditions. R.J.F.

N86-20947# Joint Publications Research Service, Arlington, VA. **RESEARCH CONTRIBUTIONS IN ASTRONOMY, SATELLITE REMOTE SENSING**

In its East Europe Report (JPRS-EER-86-007) p 152-154 17 Jan. 1986 Transl. into ENGLISH from Astronautyka (Warsaw, Poland), No. 4, Apr. 1985 p 2 Avail: CASI HC A09/MF A01

Various research programs in astronomy and remote sensing are briefly discussed. A space probe to study Halley's Comet, interstellar gas investigations, magnetic star studies, a spaceborne telescope and spaceborne infrared photography are among the topics covered. R.J.F.

N86-25873*# National Academy of Sciences - National Research Council, Washington, DC.

REMOTE SENSING OF THE EARTH FROM SPACE: A PROGRAM IN CRISIS Final Report

Dec. 1985 111 p Sponsored in part by National Academy of Sciences - National Research Council, Washington, D.C. Prepared in cooperation with NOAA, Rockville, Md. (Contract NASW-3706; NA83DA-C-00013) (NASA-CR-176796; NAS 1.26:176796; PB86-152923) Avail: CASI HC A06/MF A02

The present situation in earth remote sensing, determining why certain problems exist, and trying to find out what can be done to solve these problems are discussed. The conclusion is that operational remote sensing is in disarray. The difficulties involve policy and institutional issues. Recommendations are given. Author

N86-26669*# Kansas Univ. Center for Research, Inc., Lawrence, KS. Space Technology Center.

RESEARCH ON ENHANCING THE UTILIZATION OF DIGITAL MULTISPECTRAL DATA AND GEOGRAPHIC INFORMATION SYSTEMS IN GLOBAL HABITABILITY STUDIES Final Report, 1985-1986

E. A. MARTINKO and J. W. MERCHANT Feb. 1986 60 p Sponsored in part by the Kansas Fish and Game Commission (Contract NGL-17-004-024)

(NASA-CR-177294; NAS 1.26:177294) Avail: CASI HC A04/MF A01

The University of Kansas Applied Remote Sensing (KARS) program is engaged in a continuing long term research and development effort designed to reveal and facilitate new applications of remote sensing technology for decision makers in governmental agencies and private firms. Some objectives of the program follows. The development of new modes of analyzing multispectral scanner, aerial camera, thermal scanner, and radar data, singly or in concert in order to more effectively use these systems. Merge data derived from remote sensing with data derived from conventional sources in geographic information systems to facilitate better environmental planning. Stimulation of the application of the products of remote sensing systems to problems of resource management and environmental quality now being addressed in NASA's Global Habitability directive. The application of remote sensing techniques and analysis and geographic information systems technology to the solution of significant concerns of state and local officials and private industry. The guidance, assistance and stimulation of faculty, staff and students in the utilization of information from the Earth Resources Satellite (LANDSAT) and Aircraft Programs of NASA in research, education, and public service activities carried at the University of Kansas. E.R.

N86-26675# Geological Survey, Reston, VA. National Mapping Div.

RESEARCH, INVESTIGATIONS AND TECHNICAL DEVELOPMENTS: NATIONAL MAPPING PROGRAM, 1983-1984

R. B. MCEWEN 1985 134 p
(PB86-166097; USGS-OFR-85-304) Avail: CASI HC A07/MF A01

Subject areas covered are cartography, photogrammetry and surveying, image mapping, remote sensing, land use and land cover mapping, and geographic information systems. The influence of digital cartographic concepts is found throughout and is leading not only to the automation of map making but to the computer analysis of spatial data, the essence of modern geographic information systems. There are several activities of special interest. These include the 1:100,000-scale digital cartographic data base, the LANDSAT Thematic Mapper image map of Great Salt Lake and Vicinity, the successful testing of the Aerial Profiling of Terrain System, several applications of geographic information systems, and publication of the first chapters of the National Gazetteer of the United States. NTIS

N86-32828*# Environmental Research Inst. of Michigan, Ann Arbor, MI. Applications Div.

A FUELWOOD PLANTATION SITE SELECTION PROCEDURE USING GEOGRAPHIC INFORMATION SYSTEM TECHNOLOGY: A CASE STUDY IN SUPPORT OF THE NASA GLOBAL HABITABILITY PROGRAM Final Report, 1 Feb. 1985 - 30 Jun. 1985

N. E. G. ROLLER, J. E. COLWELL, and A. N. SELLMAN Jul. 1985 39 p
(Contract NASW-3852)
(NASA-CR-179704; NAS 1.26:179704; ERIM-173900-2-F) Avail: CASI HC A03/MF A01

A study undertaken in support of NASA's Global Habitability Program is described. A demonstration of geographic information system (GIS) technology for site evaluation and selection is given. The objective was to locate potential fuelwood plantations within a 50 km radius of Nairobi, Kenya. A model was developed to evaluate site potential based on capability and suitability criteria and implemented using the Environmental Research Institute of Michigan's geographic information system. Author

N86-32863*# California Univ., Santa Barbara, CA.
REMOTE SENSING INFORMATION SCIENCES RESEARCH GROUP, SANTA BARBARA INFORMATION SCIENCES RESEARCH GROUP, YEAR 3 Final Report

J. E. ESTES, T. SMITH, and J. L. STAR 5 Jan. 1986 87 p
(Contract NAGW-455)
(NASA-CR-179769; NAS 1.26:179769) Avail: CASI HC A05/MF A01

Research continues to focus on improving the type, quantity, and quality of information which can be derived from remotely sensed data. The focus is on remote sensing and application for the Earth Observing System (Eos) and Space Station, including associated polar and co-orbiting platforms. The remote sensing research activities are being expanded, integrated, and extended into the areas of global science, georeferenced information systems, machine assisted information extraction from image data, and artificial intelligence. The accomplishments in these areas are examined.

N88-15283*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

FROM PATTERN TO PROCESS: THE STRATEGY OF THE EARTH OBSERVING SYSTEM: VOLUME 2: EOS SCIENCE STEERING COMMITTEE REPORT

1987 153 p Original document contains color illustrations
(NASA-TM-89702; NAS 1.15:89702) Avail: CASI HC A08/MF A02

The Earth Observing System (EOS) represents a new approach to the study of the Earth. It consists of remotely sensed and

correlative in situ observations designed to address important, interrelated global-scale processes. There is an urgent need to study the Earth as a complete, integrated system in order to understand and predict changes caused by human activities and natural processes. The EOS approach is based on an information system concept and designed to provide a long-term study of the Earth using a variety of measurement methods from both operational and research satellite payloads and continuing ground-based Earth science studies. The EOS concept builds on the foundation of the earlier, single-discipline space missions designed for relatively short observation periods. Continued progress in our understanding of the Earth as a system will come from EOS observations spanning several decades using a variety of contemporaneous measurements. F.M.R.

N88-18046*# National Aeronautics and Space Administration, Washington, DC.

SPACE-BASED REMOTE SENSING OF THE EARTH: A REPORT TO THE CONGRESS

Sep. 1987 147 p Original document contains color illustrations Prepared in cooperation with National Oceanic and Atmospheric Administration, Washington, D.C.
(NASA-TM-89709; NAS 1.15:89709) Avail: SOD HC \$9.00 as 033-000-00983-6; NTIS MF A01

The commercialization of the LANDSAT Satellites, remote sensing research and development as applied to the Earth and its atmosphere as studied by NASA and NOAA is presented. Major gaps in the knowledge of the Earth and its atmosphere are identified and a series of space based measurement objectives are derived. The near-term space observations programs of the United States and other countries are detailed. The start is presented of the planning process to develop an integrated national program for research and development in Earth remote sensing for the remainder of this century and the many existing and proposed satellite and sensor systems that the program may include are described. Author

N89-14481*# California Univ., Santa Barbara, CA.
REMOTE SENSING INFORMATION SCIENCES RESEARCH GROUP Final Report, Year 5

JOHN E. ESTES, TERENCE SMITH, and JEFFREY L. STAR 1 Jun. 1988 61 p
(Contract NAGW-455)
(NASA-CR-183374; NAS 1.26:183374) Avail: CASI HC A04/MF A01

Research conducted under this grant was used to extend and expand existing remote sensing activities at the University of California, Santa Barbara in the areas of georeferenced information systems, matching assisted information extraction from image data and large spatial data bases, artificial intelligence, and vegetation analysis and modeling. The research thrusts during the past year are summarized. The projects are discussed in some detail. B.G.

N89-22979*# California Univ., Santa Barbara, CA.
REMOTE SENSING INFORMATION SCIENCES RESEARCH GROUP: BROWSE IN THE EOS ERA Final Report

JOHN E. ESTES and JEFFREY L. STAR 1 May 1989 155 p
(Contract NAGW-987)
(NASA-CR-184637; NAS 1.26:184637) Avail: CASI HC A08/MF A02

The problem of science data browse was examined. Given the tremendous data volumes that are planned for future space missions, particularly the Earth Observing System in the late 1990's, the need for access to large spatial databases must be understood. Work was continued to refine the concept of data browse. Further, software was developed to provide a testbed of the concepts, both to locate possibly interesting data, as well as view a small portion of the data. Build II was placed on a minicomputer and a PC in the laboratory, and provided accounts for use in the testbed. Consideration of the testbed software as an element of in-house data management plans was begun. Author

43 EARTH RESOURCES AND REMOTE SENSING

**N89-27231# KRS Remote Sensing, Landover, MD.
STUDY FOR AN ADVANCED CIVIL EARTH REMOTE SENSING
SYSTEM. VOLUME 1: EXECUTIVE SUMMARY**

Aug. 1988 47 p

(Contract MANE-8-00001)

(PB89-163257; NOAA-NERDIS-89/05-VOL-1) Avail: CASI HC A03/MF A01; also available in set of 3 reports HC E99 as

Presented here are the results of a comprehensive study of options for an Advanced Civil Earth Remote Sensing System (ACERSS) to follow LANDSAT 6. The study approach followed three basic steps: projection of worldwide market demand for raw data and value added information products; identification of technical and implementation options for satisfying this demand; and determination of the commercial viability of these options. Author

**N89-27232# KRS Remote Sensing, Landover, MD.
STUDY FOR AN ADVANCED CIVIL EARTH REMOTE
SENSING SYSTEM. VOLUME 2: MARKET AND FINANCIAL
ASSESSMENT Final Report**

Aug. 1988 470 p

(Contract MANE-8-00001)

(PB89-163265; NOAA-NESDIS-89/06-VOL-2) Avail: CASI HC A20/MF A04; also available in set of 3 reports HC E99 as

The results of a comprehensive study of options for an Advanced Civil Earth Remote Sensing System (ACERSS) to follow LANDSAT 6 are given. The study approach followed three basic steps: projection of worldwide market demand for raw data and value added information products; identification of technical and implementation options for satisfying this demand; and determination of the commercial viability of these options. Here, market profiles for remote sensing data are given. Author

**N89-27233# Earth Satellite Corp., Chevy Chase, MD.
AN ASSESSMENT OF INFORMATION DEMANDS FOR REMOTE
SENSING AND GEOGRAPHIC INFORMATION SYSTEM
TECHNOLOGIES Final Report**

WILLIAM G. BROONER, PAUL M. MAUGHAN, and DAVID A. THIBAUT Feb. 1988 145 p

(Contract AID/PDC-1406-I-00-7070-00)

(PB89-159313; AID-PN-AAZ-554) Avail: CASI HC A07/MF A02

In the Fall of 1987, a research assessment of the potential benefits to the Third World of new applications of remote sensing and geographic based information systems (GIS) technologies was completed. Presented here are the findings, conclusions, and recommendations of that assessment. The principal need in the developing countries is for information which will support the production of food and fiber. Information on current food and fiber production, and near-term forecasts, is essential if nations are to avoid the impact of catastrophic shortages. There is an increasing recognition by Third World countries that critical biological resources are threatened by uncontrolled development and that the long-term consequences of the process may irreversibly impact both the local and world environment. Effective development planning requires basic maps of the physical environment, including planimetric base maps, current and potential land use, demography, current and planned infrastructure. Author

**N90-21445# Instituto de Pesquisas Espaciais, Sao Jose dos
Campos (Brazil). Departamento de Processamento de Imagens.
ANALYSIS AND MODELLING OF SPATIAL DATA PROPOSAL
OF A SYSTEM FOR CBERS**

DIOGENES SALAS ALVES, GILBERTO CAMARA NETO, RICARDO CARTAXO MODESTODESOUZA, JUAN CARLOS PINTODEGARRIDO, and FERNANDO AUGUSTA MITSUO, II Oct. 1989 8 p Presented at the 4th Simposio Latinoamericano sobre Sensores Remotos, Bariloche, Argentina, 20-24 Nov. 1989 (INPE-4911-PRE/1512) Avail: CASI HC A02/MF A01

Requirements are introduced for an analysis/modeling system of spatial information, aimed at combining remotely sensed data with information from other sources. The work was conceived as an aid for INPE's CBERS Ground Applications Segment, that encom-

passes development of an integrated system to perform the tasks of reception, production and spatial analysis. Current requirements concern aspects of visualization, input, storage, retrieval and manipulation of spatial data. A special topic formulates some guidelines for software development. Author

**N90-26377*# Vermont Univ., Burlington, VT. Remote Sensing
Applications Program.**

PRACTICAL APPLICATIONS OF REMOTE SENSING

TECHNOLOGY Final Report, 1 Jun. 1978 - 31 May 1987

ROY A. WHITMORE, JR. 1 Aug. 1990 57 p

(Contract NSG-7453)

(NASA-CR-186810; NAS 1.26:186810) Avail: CASI HC A04/MF A01

Land managers increasingly are becoming dependent upon remote sensing and automated analysis techniques for information gathering and synthesis. Remote sensing and geographic information system (GIS) techniques provide quick and economical information gathering for large areas. The outputs of remote sensing classification and analysis are most effective when combined with a total natural resources data base within the capabilities of a computerized GIS. Some examples are presented of the successes, as well as the problems, in integrating remote sensing and geographic information systems. The need to exploit remotely sensed data and the potential that geographic information systems offer for managing and analyzing such data continues to grow. New microcomputers with vastly enlarged memory, multi-fold increases in operating speed and storage capacity that was previously available only on mainframe computers are a reality. Improved raster GIS software systems have been developed for these high performance microcomputers. Vector GIS systems previously reserved for mini and mainframe systems are available to operate on these enhanced microcomputers. One of the more exciting areas that is beginning to emerge is the integration of both raster and vector formats on a single computer screen. This technology will allow satellite imagery or digital aerial photography to be presented as a background to a vector display. Author

**N91-14634*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, VA.**

**ADVANCED TECHNOLOGY NEEDS FOR A GLOBAL CHANGE
SCIENCE PROGRAM: PERSPECTIVE OF THE LANGLEY
RESEARCH CENTER**

LAWRENCE F. ROWELL (National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.) and THOMAS J. SWISSLER (ST Systems Corp., Hampton, VA.) Washington Jan. 1991 134 p

(Contract RTOP 506-49-21-02)

(NASA-TM-4196; L-16705; NAS 1.15:4196) Avail: CASI HC A07/MF A02

The focus of the NASA program in remote sensing is primarily the Earth system science and the monitoring of the Earth global changes. One of NASA's roles is the identification and development of advanced sensing techniques, operational spacecraft, and the many supporting technologies necessary to meet the stringent science requirements. Langley Research Center has identified the elements of its current and proposed advanced technology development program that are relevant to global change science according to three categories: sensors, spacecraft, and information system technologies. These technology proposals are presented as one-page synopses covering scope, objective, approach, readiness timeline, deliverables, and estimated funding. In addition, the global change science requirements and their measurement histories are briefly discussed. Author

**N91-17438*# Purdue Univ., West Lafayette, IN. Lab. for Applica-
tions of Remote Sensing.**

**NASA APPLICATIONS PROJECT IN MIAMI COUNTY, INDIANA
Progress Report**

CHRIS J. JOHANNSEN, R. NORBERTO FERNANDEZ, and D. FABIAN LOZANO-GARCIA Jun. 1990 62 p

(Contract NAGW-1472)

(NASA-CR-187916; NAS 1.26:187916; LARS-CR-012391) Avail: CASI HC A04/MF A01

This project was designed to acquaint county government officials and their clientele with remote sensing and geographic information systems (GIS) products that contain information about land conditions and land use. The specific project objectives are: (1) to investigate the feasibility of using remotely sensed data to identify and quantify specific land cover categories and conditions for purposes of tax assessment, cropland area measurements, and land use evaluation; (2) to evaluate the use of remotely sensed data to assess soil resources and conditions which affect productivity; (3) to investigate the use of satellite remote sensing data as an aid in assessing soil management practices; and (4) to evaluate the market potential of products derived from the above projects.

Author

N91-21623# Army Engineer Topographic Labs., Fort Belvoir, VA. **DESIGN AND DEVELOPMENT OF THE TERRAIN INFORMATION EXTRACTION SYSTEM** Scientific Paper, 23 - 27 Jul. 1990

GREGORY B. DESMOND and DANIEL L. EDWARDS 4 Sep. 1990 12 p

(AD-A231166; ETL-R-153) Avail: CASI HC A03/MF A01

A program has been initiated for the design and development of a Terrain Information Extraction System (TIES). This is a test-bed system which will integrate many diverse capabilities drawn from the fields of photogrammetry, remote sensing, automated cartography, and geographic information systems; all within a distributed, digital environment. TIES will be an extensible, modular system which will be used to develop more responsive and reliable techniques to generate digital terrain databases. The system will provide a beginning-to-end mapping and exploitation capability utilizing a number of digital and digitized image source materials to collect data needed for various military and civilian activities. These activities include wetlands delineation and water resources management. TIES is being developed on commercial off-the-shelf hardware, and will incorporate both proprietary and public domain software. Major components of the system include an image scanner, a digital stereo photogrammetric workstation, and a geographic information system.

DTIC

N91-24055*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

POTENTIAL COMMERCIAL USES OF EOS REMOTE SENSING PRODUCTS

LESLIE L. THOMPSON In NASA, Washington, Technology 2000, Volume 2 p 122-129 1991

Avail: CASI HC A02/MF A03

The instrument complement of the Earth Observing System (EOS) satellite system will generate data sets with potential interest to a variety of users who are now just beginning to develop geographic information systems tailored to their special applications and/or jurisdictions. Other users may be looking for a unique product that enhances competitive position. The generally distributed products from EOS will require additional value added processing to derive the unique products desired by specific users. Entrepreneurs have an opportunity to create these proprietary level 4 products from the EOS data sets. Specific instruments or collections of instruments could provide information for crop futures trading, mineral exploration, television and printed medium news products, regional and local government land management and planning, digital map directories, products for third world users, ocean fishing fleet probability of harvest forecasts, and other areas not even imagined at this time. The projected level 3 product are examined that will be available at launch from EOS instruments and commercial uses of the data after value added processing is estimated.

Author

N91-24671*# Research Inst. for Computing and Information Systems, Houston, TX.

EARTH VIEW: A BUSINESS GUIDE TO ORBITAL REMOTE SENSING

PETER C. BISHOP Jul. 1990 131 p
(Contract NCC9-16)

(NASA-CR-188238; NAS 1.26:188238) Avail: CASI HC A07/MF A02

The following subject areas are covered: Earth view - a guide to orbital remote sensing; current orbital remote sensing systems (LANDSAT, SPOT image, MOS-1, Soviet remote sensing systems); remote sensing satellite; and remote sensing organizations.

Author

N91-30173# Joint Publications Research Service, Arlington, VA. **SOVIET PARTICIPATION IN FIFE-1989 REMOTE SENSING STUDY**

A. M. GRIN and V. V. KOZODEROV In its JPRS Report: Science and Technology. USSR: Space p 24-27 26 Jun. 1991 Transl. into ENGLISH from Priroda, Moscow (USSR), no. 12, Dec. 1990 p 60-65

Avail: CASI HC A01/MF A01

In the summer of 1989, a group of Soviet specialists participated in the FIFE-1989 field experiment. Their objective was to obtain data for the interpretation of satellite observations of the condition of the land surface. The results of this work are presented and discussed. The data obtained in the FIFE-1989 experiment make it possible to approximate a reliable estimate of the state of the Earth's surface from remote sensing data, which is quite significant in the organization of space monitoring.

Author

N91-30588*# National Aeronautics and Space Administration, Washington, DC.

EARTH OBSERVATIONS AND GLOBAL CHANGE DECISION MAKING: A SPECIAL BIBLIOGRAPHY, 1991

Jun. 1991 99 p

(NASA-SP-7092; NAS 1.21:7092) Avail: CASI HC A05/MF A02

The first section of the bibliography contains 294 bibliographic citations and abstracts of relevant reports, articles, and documents announced in 'Scientific and Technical Aerospace Reports (STAR)' and 'International Aerospace Abstracts (IAA)'. These abstracts are categorized by the following major subject divisions: aeronautics, astronautics, chemistry and materials, engineering, geosciences, life sciences, mathematical and computer sciences, physics, social sciences, space sciences and general. Following the abstract section, seven indexes are provided for further assistance.

Author

N91-30592*# Commerce Energy NASA NLM Defense Information Cataloging Committee, Oak Ridge, TN.

DATA POLICY AND AVAILABILITY SUPPORTING GLOBAL CHANGE RESEARCH, DEVELOPMENT, AND DECISION-MAKING: AN INFORMATION PERSPECTIVE

BONNIE C. CARROLL (Commerce Energy NASA NLM Defense Information Cataloging Committee, Oak Ridge, TN.), ROBERT F. JACK (NASA Center for Aerospace Information, Baltimore-Washington International Airport, MD.), and GLADYS A. COTTER (National Aeronautics and Space Administration, Washington, DC.) Oct. 1990 15 p

(NASA-TM-105137; NAS 1.15:105137) Avail: CASI HC A03/MF A01

An explosion of information has created a crisis for today's information age. It has to be determined how to use the best available information sources, tools, and technology. To do this it is necessary to have leadership at the interagency level to promote a coherent information policy. It is also important to find ways to educate the users of information regarding the tools available to them. Advances in technology resulted in efforts to shift from Disciplinary and Mission-oriented Systems to Decision Support Systems and Personalized Information Systems. One such effort is being made by the Interagency Working Group on Data Management for Global Change (IAWGDMGC). Five federal agencies - the Department of Commerce (DOC), Department of Energy (DOE), National Aeronautics and Space Administration (NASA), National Library of Medicine (NLM), and Department of Defense (DOD) - have an on-going cooperative information management group, CENDI (Commerce, Energy, NASA, NLM, and Defense Information), that is

43 EARTH RESOURCES AND REMOTE SENSING

meeting the challenge of coordinating and integrating their information management systems. Although it is beginning to be technically feasible to have a system with text, bibliographic, and numeric data online for the user to manipulate at the user's own workstation, it will require national recognition that the resource investment in such a system is worthwhile, in order to promote its full development. It also requires close cooperation between the producers and users of the information - that is, the research and policy community, and the information community. National resources need to be mobilized in a coordinated manner to move people into the next generation of information support systems. Author

N92-15468*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

MICROWAVE SENSING TECHNOLOGY ISSUES RELATED TO A GLOBAL CHANGE TECHNOLOGY ARCHITECTURE TRADE STUDY

THOMAS G. CAMPBELL, JIM SHIUE, DENIS CONNOLLY, and KEN WOO (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) *In its* Global Change Technology Architecture Trade Study p 181-186 Sep. 1991

Avail: CASI HC A01/MF A04

The objectives are to enable the development of lighter and less power consuming, high resolution microwave sensors which will operate at frequencies from 1 to 200 GHz. These systems will use large aperture antenna systems (both reflector and phased arrays) capable of wide scan angle, high polarization purity, and utilize sidelobe suppression techniques as required. Essentially, the success of this technology program will enable high resolution microwave radiometers from geostationary orbit, lightweight and more efficient radar systems from low Earth orbit, and eliminate mechanical scanning methods to the fullest extent possible; a main source of platform instability in large space systems. The Global Change Technology Initiative (GCTI) will develop technology which will enable the use of satellite systems for Earth observations on a global scale. Author

N92-15476*# Joint Inst. for Advancement of Flight Sciences, Hampton, VA.

PLOTS OF GROUND COVERAGE ACHIEVEABLE BY GLOBAL CHANGE MONITORING INSTRUMENTS AND SPACECRAFT HEATHER R. KNIGHT and LYNDIA FOERNSLER (Auburn Univ., AL.) *In* NASA. Langley Research Center, Global Change Technology Architecture Trade Study p 381-411 Sep. 1991

Avail: CASI HC A03/MF A04

Low Earth Orbit (LEO) and Geosynchronous Earth Orbit (GEO) satellite plots are given. All satellites are in an 800 km circular orbit at an inclination of 98.6 deg (sun synchronous). Specifics of the instrument package are given. Additionally, the time period of the plot and the percentage of the Earth covered during the time period are listed. Author

N92-23655*# Intergraph Corp., Reston, VA. International Marketing Div.

CENTER FOR MAPPING, OHIO STATE UNIVERSITY

LOWELL STARR *In* NASA, Washington, Proceedings of the Second Annual Symposium on Industrial Involvement and Successes in Commercial Space 17 p 1991

Avail: CASI HC A03/MF A03

There are many future opportunities for Centers for the Commercial Development of Space (CCDS) activities that are directly linked to industry strategic objectives. In the fields of mapping, remote sensing, and geographic information systems (GIS), the near term opportunities may exceed all that have occurred in the past 10 years. It is strongly believed that a national spatial data infrastructure must be established in this country, if we are to remain a leader in the information age. Author

N92-26781 Colorado Univ., Boulder, CO.

THE EFFECT OF GLOBAL CHANGE AND LONG PERIOD TIDES ON THE EARTH'S ROTATION AND GRAVITATIONAL

POTENTIAL Ph.D. Thesis

ANDREW SETH TRUPIN 1991 224 p

Avail: Univ. Microfilms Order No. DA9132625

The effects of a possible global warming, in particular the rising sea level and melting glaciers, has been a topic of great interest. The attempt here is to quantify the effect these changes and long period ocean tides have on the Earth's rotation and gravity. Global averages of tide gauge data, after correcting for the effects of post glacial rebound on individual station records, reveal an increase in sea level for the years 1900-1979, of between 1.5 and 2.0 mm/yr. The global response of sea level to atmospheric pressure is found to be inverted barometer at periods greater than two months. Tide gauge data are fitted to numerically generated tidal data to show that the 18.6 year lunar nodal tide and 14.3 month pole tide have amplitudes and phases that are consistent with a global equilibrium response. The large coherence at 437 days between pressure and sea level in the North Sea, Baltic Sea and the Gulf of Bothnia may be due to meteorological forcing. The effects on the Earth's rotation and gravitational potential due to changes in annual mass balance for 85 glaciers in 13 mountain glacier systems for the years 1965-1984 are generally at or below detectable limits, but the contribution to sea level rise for these glaciers is 0.14 mm/year. Gridded accumulation data for the Antarctic ice sheet and for the Greenland ice sheet are used along with estimates of the rate of discharge from the ice sheets to estimate the contributions these two regions make to the Earth's gravity and rotation. The Antarctic contribution to the gravitational signal and to the displacement of the solid earth are found to be within the limits of detection by satellites. The secular trends in the X and Y-components of observed polar motion excitation agree well with the Antarctic contributions, for a model where the interior portions of the ice sheet undergo thinning and the coastal regions thicken. Changes in polar or glacial ice do not agree well with observed changes in the length of day during the last 80 years. Dissert. Abstr.

N92-30915# Indian Inst. of Tech., Bombay. Centre of Studies in Resources Engineering.

GEOGRAPHIC INFORMATION SYSTEM AND ITS APPLICATIONS

P. VENKATACHALAM *In its* Satellite and Radar Data Use in Rainfall-Runoff Models p 136-147 Feb. 1992

Avail: CASI HC A03/MF A03

Described here are the principles behind the construction of the Geographic Information System (GIS), the development of a regional information system as a case study, and the role of remote sensing data in GIS. Topics covered include data encoding, input processing, data management, data retrieval, data display, the role of data models and structure, vector models, tessellation models, hardware configurations, and the use of GIS to assess surface runoff and soil erosion. Author

N92-32590*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

DEVELOPMENT OF A PROTOTYPE SPATIAL INFORMATION PROCESSING SYSTEM FOR HYDROLOGIC RESEARCH

JAYANTA K. SIRCAR Nov. 1991 52 p

(Contract NAG5-1466)

(NASA-CR-191224; NAS 1.26:191224) Avail: CASI HC A04/MF A01

Significant advances have been made in the last decade in the areas of Geographic Information Systems (GIS) and spatial analysis technology, both in hardware and software. Science user requirements are so problem specific that currently no single system can satisfy all of the needs. The work presented here forms part of a conceptual framework for an all-encompassing science-user workstation system. While definition and development of the system as a whole will take several years, it is intended that small scale projects such as the current work will address some of the more short term needs. Such projects can provide a quick mechanism to integrate tools into the workstation environment forming a larger, more complete hydrologic analysis platform. Described here are two components that are very important to the practical use of remote

sensing and digital map data in hydrology. Described here is a graph-theoretic technique to rasterize elevation contour maps. Also described is a system to manipulate synthetic aperture radar (SAR) data files and extract soil moisture data. Author

N93-14823 Waterloo Univ. (Ontario).

INTEGRATING SATELLITE IMAGERY INTO A GEOGRAPHIC INFORMATION SYSTEM FOR MONITORING THE DOWNSTREAM IMPACTS OF DAM CONSTRUCTION ON FLOOD-PLAIN AGRICULTURE IN SOKOTO STATE, NIGERIA Ph.D. Thesis

PAUL GILLES PILON 1991 215 p

Avail: Univ. Microfilms Order No. DANN69108

In developing countries, such as Nigeria, large-scale resource development often proceeds without adequate attention being given to the consequential effects of development on natural resources and the environment. In northern Nigeria, environmental change associated with the construction of two large-scale dams has had a negative impact on traditional agricultural activities in floodplain areas downstream of the dams. Although the negative effects of these dams have been acknowledged by local government agencies for some time, the exact extent, location and nature of downstream impacts have remained largely unknown. This can be attributed, in part, to a failure to acquire and examine relevant resource and environmental information on the consequential effects of such large-scale development prior to project implementation. Post-development attempts to monitor the impacts of dam construction are hampered by a lack of relevant information describing pre-dam and post-dam conditions, and the difficulty of comparing diverse data sources in such a way that they can be effectively utilized for integrated resource monitoring. The research reported in this thesis utilizes satellite imagery as the primary multitemporal data source and incorporates this imagery with other available spatial data in a geographic database. Spatial data sets acquired for a floodplain area in northern Nigeria are compiled and co-registered using a TYDAC SPANS Geographic Information System. The data sets include: soil, topographic and relief information obtained from existing maps and aerial photographs; land cover and land use information; and change information derived from multitemporal satellite imagery, and questionnaire and field observation data. Comparative analysis of the data sets indicates that the effects of dam construction are not equally distributed in downstream areas. Farmers who have fields adjacent to the main river courses are more likely to benefit positively from regulated water flow associated with dam construction. In areas farther from the main river courses, where the availability of water has been reduced, impacts are more detrimental. Such information on the precise nature, magnitude and location of impacts can help identify specific sites where remedial measures such as diversion canals, new wells or the installation of pumps can be most effectively located to assist local farmers. Dissert. Abstr.

N93-19739# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

UPDATING TOPOGRAPHIC MAPS USING ORBITAL IMAGES IN A MICROCOMPUTER ENVIRONMENT [ACTUALIZACION DE CARTAS TOPOGRAFICAS USANDO IMAGENES ORBITALES EN UN AMBIENTE DE MICROCOMPUTADORAS] OSCAR RICARDO VERGARA, ALEJANDRO CONTRERAS FRAU, and JULIA CESAR LIMA DALGE Jul. 1992 11 p In PORTUGUESE

(INPE-5409-PRE/1756) Avail: CASI HC A03/MF A01

The problem of obsolescence of topographic maps is frequently aggravated by rapidity of changes due to development of some regions, with respect to the slowness of traditional updating procedures based on the use of aerial photographs. Therefore, it is of interest to study working methods which will shorten the time necessary to generate an updated map, without prejudice to its geometric precision. In this study, we conducted a practical application of a topographic map updating method which incorporates TM-LANDSAT digital imagery interpretation and makes use of the advantages offered by SITIM-SIG/INPE (The Geographic Informa-

tion Image Treatment System developed in the Brazilian National Space Research Institute). Transl. by FLS

N93-23239* National Aeronautics and Space Administration, Washington, DC.

BIBLIOGRAPHY OF GLOBAL CHANGE, 1992

Feb. 1993 175 p

(NASA-SP-7102; NAS 1.21:7102) Avail: CASI HC A08/MF A02

This bibliography lists 585 reports, articles, and other documents introduced in the NASA Scientific and Technical Information Database in 1992. The areas covered include global change, decision making, earth observation (from space), forecasting, global warming, policies, and trends. Derived from text

N93-24309# California Univ., La Jolla, CA. Sea Grant Coll.

REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS: IMPLICATIONS FOR GLOBAL MARINE FISHERIES JAMES J. SIMPSON (Scripps Institution of Oceanography, San Diego, CA.) 1992 28 p

(Contract NA89AA-D-SG-138; PROJ. A/S-3)

(PB93-149409; T-CSGCP-025) Avail: CASI HC A03/MF A01

During the decade of the 1990's, several major fishing countries will launch satellites with improved, next generation ocean color sensors. This new technology, especially when combined with satellite-based estimates of sea surface temperature and geographic information systems, provides the possibility of near real-time support for the management and utilization of both pelagic and mid- to deep-water fisheries. This report reviews current state-of-the-art efforts in these areas, makes projections about anticipated uses of the new technologies in global marine fisheries, and evaluates the position of the United States relative to foreign fishing powers in the aforementioned areas. NTIS

N93-25434 California Univ., Santa Barbara, CA.

MULTI-TEMPORAL SATELLITE IMAGE ANALYSIS FOR CROP INVENTORIES IN THE PO RIVER VALLEY (ITALY) Ph.D. Thesis DANIELE EHRlich 1992 180 p

Avail: Univ. Microfilms Order No. DA9303185

This dissertation describes satellite data image processing for crop area estimation in Veneto region (Italy). Several quantitative image analysis exercises were carried out to investigate the information content of Landsat Thematic Mapper imagery with reference to the landscape of the Veneto region. These exercises include multi-temporal image normalization, multi-temporal image classification of selected study sites, 'greenness' temporal profile modeling and development of an advanced agricultural information system for the integration of different data types describing the landscape for an optimal crop area estimation. Multi-temporal image normalization was performed using the procedure which relies only on spectral information contained in satellite imagery. The procedure is extendible to different images and to images acquired in different growing season. The procedure worked well especially for correcting systematic radiometric variation such as offsets in radiometric calibration coefficients, sun angle differences and uniform variation in atmosphere turbidity. Multi-temporal image classification at selected study sites was conducted to identify pattern of crop growth as detected from spectral imagery. Three study sites, each containing four annual crops under study were classified using several pattern recognition techniques. The image analysis revealed phenology related spectral crop pattern which were used to separate the crop under study. Crop classification accuracies as computed in the study sites yielded accuracies which range between 71 percent to 82 percent according to the crop and the area under investigation. Greenness temporal profile modeling, an image processing technique which exploits graphical shape rather than statistical characteristic of the image was also attempted for an improved crop type classification. Temporal profile analysis provided additional information on spectral properties of crops through time. Classification accuracy results obtained with temporal profile analysis resulted being comparable to pattern recognition techniques. Finally, knowledge on the information content of Landsat Thematic Mapper

images combined with knowledge on the processes occurring on the landscape were combined in an image processing procedure which uses both image processing algorithms and geographic information system operations. Image analysis has been conducted within the framework of an advanced agricultural information system (AAIS). The AAIS is a raster based geographic information system which integrates several data types including satellite imagery, analog map data and ancillary information in the form of knowledge about the processes occurring in the landscape. The system is open to new input and can continuously be updated upon the arrival of new information. As such AAIS is a model which quantitatively describes some important components of the agricultural system and can be used to predict physical as well as social processes in the landscape. Dissert. Abstr.

N93-25615* National Aeronautics and Space Administration. John C. Stennis Space Center, Bay Saint Louis, MS.

COMMERCIAL APPLICATIONS MULTISPECTRAL SENSOR SYSTEM

RONALD J. BIRK (Sverdrup Technology, Inc., Bay Saint Louis, MS.) and BRUCE SPIERING In NASA, Washington, Technology 2002: The Third National Technology Transfer Conference and Exposition, Volume 1 p 515-526 Feb. 1993 Previously announced in IAA as A93-28081

Avail: CASI HC A03/MF A04

NASA's Office of Commercial Programs is funding a multispectral sensor system to be used in the development of remote sensing applications. The Airborne Terrestrial Applications Sensor (ATLAS) is designed to provide versatility in acquiring spectral and spatial information. The ATLAS system will be a test bed for the development of specifications for airborne and spaceborne remote sensing instrumentation for dedicated applications. This objective requires spectral coverage from the visible through thermal infrared wavelengths, variable spatial resolution from 2-25 meters; high geometric and geo-location accuracy; on-board radiometric calibration; digital recording; and optimized performance for minimized cost, size, and weight. ATLAS is scheduled to be available in 3rd quarter 1992 for acquisition of data for applications such as environmental monitoring, facilities management, geographic information systems data base development, and mineral exploration. Author

N93-25707 Louisiana State Univ., Baton Rouge, LA.
DETECTING THE SCALE AND RESOLUTION EFFECTS IN REMOTE SENSING AND GIS Ph.D. Thesis

CHANGYONG CAO 1992 222 p

Avail: Univ. Microfilms Order No. DA9302893

The relationship between resolution and fractal dimensions of remotely sensed images is examined. Based on the results of testing for the reliability of the algorithms on hypothetical surfaces, the isarithm algorithm is selected for determining the fractal dimensions of remotely sensed images. This algorithm is then applied to simulated fractal Brownian motion images and four calibrated airborne multispectral remotely sensed image data sets with different true and artificial resolutions for Puerto Rico. The results from applying the fractal method to images at different levels of resolution suggest that the higher the resolution of an image, the higher the fractal dimension of the image and the more complex the image surface. This relationship between resolution and fractal dimension is further verified by results from analysis employing the local variance method for the same data sets; where it is found that the higher the resolution, the higher the local variance or the more complex the image surface. The images with artificial resolutions were found to be unrealistic in simulating images with different resolutions because the aggregate method used in generating these images does not exactly simulate the sensor's response to resolution changes. The aggregate method was widely used in image resampling and cautious use of this algorithm is suggested in future studies. The findings show that the fractal method is a useful tool in detecting the scale and resolution effects of remotely sensed images and in evaluating the trade-offs between data volume and data accuracy. More studies employing fractals and other spatial

statistics to images with different artificial resolutions generated using better aggregation algorithms are needed in the future in order to further detect the scale and resolution effects in remote sensing and Geographic Information Systems (GIS). Dissert. Abstr.

N94-11524# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

LANDSAT AS A COMMERCIAL ENTERPRISE M.S. Thesis

MARIA CARMEN DEMELLO LEMOS 1992 62 p

(INPE-5477-TAE/019) Avail: CASI HC A04/MF A01

In 1985 the government of the United States signed a contract with the Earth Observation Satellite Company (EOSAT) transferring the operation and future development of the country's earth resources observation system, the Landsat. The objective of this study is to discuss the commercialization of the Landsat system in light of its economical and political implications, mainly concerning international relations, security and the U.S. leadership in space technology. The commercialization allegedly goals were mainly to establish a strong market for Landsat data and to cut government's support for operations and construction costs. So far neither goal was satisfactorily met. The general conclusion of this study is that the Landsat transfer to the private sector was much more motivated by budget cuts than by the real possibilities of Landsat surviving as a private enterprise. As a consequence, the Landsat program has been seriously threatened of termination in the past 5 years with dramatic political, social and economical consequences to the United States. Author

N94-14131# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

MULTISENSOR REMOTE SENSING DATA AND GIS TECHNIQUES FOR MONITORING PRESERVATION AREAS: A CASE STUDY

YOSIO EDEMIR SHIMABUKURO, DAVID CHUNG LIANG LEE, and JOAO ROBERTODOSSANTOS Jun. 1991 14 p Presented at the 24th International Symposium on Remote Sensing of Environment, Rio de Janeiro, Brazil, 27-31 May 1991 Previously announced in IAA as A92-41028

(INPE-5317-PRE/1714) Avail: CASI HC A03/MF A01

The objective is to present the capability of remote sensing and GIS techniques for detecting and monitoring the anthropic alterations (mainly, fire action) which sometimes occur in preservation areas. For example, in the Brazil Central region occupied by savanna ('cerrado'), the vegetation burning procedure is commonly employed in the process of implantation and management of cattle raising and agricultural activities. During this annual burning process, fires even reach the environmental protection areas such as National Parks. The Emas National Park, located in South-western of Goias State, Brazil, between 52 deg 40 min W to 53 deg 10 min W and 17 deg 50 min S to 18 deg 25 min S, was selected as the study area. This National Park had its area frequently burned in the dry season, as well as in August, 1988. In this investigation, the TM/Landsat data from 29 July 1988 (before the fire) and 14 August 1988 (after the fire) and AVHRR/NOAA data obtained in this period covered by TM images were used for monitoring the biomass burning. The TM images were registered to a topographic map in order to build a database including information such as drainage, roads, elevation and vegetation type for this National Park. Pixels classified as burned areas using band 3 (3.55 um to 3.93 um) of AVHRR images were overlaid on the map derived from the database. The SITIM (Image Processing System) and SGI (Geographic Information System) developed by INPE were utilized in this research. The integration of elevation, TM multitemporal data and information extracted from AVHRR images is a valuable tool for the managers to detect and evaluate the damage occurred as well as to monitor the regeneration process of land cover. Author (revised)

N94-15245* National Aeronautics and Space Administration, Washington, DC.

VIEWS FROM SPACE (Videotape)

Feb. 1990 Videotape: 3 min. 25 sec. playing time, in color,

with sound

(NASA-TM-109634; NONP-NASA-VT-93-190432) Avail: CASI
VHS A01/BETA A22

This document shows how views from the shuttle provide
valuable information as to the condition of earth. CASI

N94-15914*# Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.

A SUMMARY OF MICROWAVE REMOTE SENSING INVESTIGATIONS PLANNED FOR BOREAS

KYLE C. MCDONALD *In its Proceedings of the Third Spaceborne Imaging Radar Symposium* p 415-416 28 May 1993
Sponsored in part by Energy, Mines and Resources Canada
Avail: CASI HC A01/MF A04

The Boreal Ecosystem - Atmosphere Study (BOREAS) is a multidisciplinary field and remote sensing study that will be implemented jointly by the United States and Canada. The goal of BOREAS is to obtain an improved understanding of the interactions between the boreal forest biome and the atmosphere in order to clarify their roles in global change. Specific objectives are to improve the understanding of the processes that govern the exchanges of water, energy, heat, carbon, and trace gases between boreal ecosystems and the atmosphere, and to develop and validate remote sensing algorithms for transferring the understanding of these processes from local to regional scales. Two principal field sites, both within Canada, were selected. The northern site is located near Thompson, Manitoba, and the southern site encompasses Prince Albert National Park in Saskatchewan. The growing season in the northern site tends to be limited by growing-degree days while the southern site is limited by soil moisture and fire frequency. Most of the field work will occur at these two sites during 1993 and 1994 as part of six field campaigns. The first of these campaigns is scheduled for August 1993 and will involve instrument installation and an operational shakedown. Three large scale Intensive Field Campaigns (IFC's) are scheduled for 1994, along with two smaller scale Focused Field Campaigns (FFC's). The first 1994 campaign will be an FFC designed to capture the biome under completely frozen conditions during the winter. The second FFC and the first IFC are scheduled to capture the spring thaw period. Another IFC will take place in the summer during a period of maximum water stress. Finally, the third FFC will be scheduled to capture the collapse into senescence during the fall.

Author (revised)

N94-16711*# Colorado Univ., Boulder, CO. Center for the Study of Earth from Space.

DISCRIMINATION AMONG SEMI-ARID LANDSCAPE ENDMEMBERS USING THE SPECTRAL ANGLE MAPPER (SAM) ALGORITHM

ROBERTA H. YUHAS, ALEXANDER F. H. GOETZ, and JOE W. BOARDMAN (Commonwealth Scientific and Industrial Research Organization, North Ryde, Australia.) *In JPL, Summaries of the Third Annual JPL Airborne Geoscience Workshop. Volume 1: AVIRIS Workshop* p 147-149 1 Jun. 1992
(Contract NAGW-270)

Avail: CASI HC A01/MF A02

Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) data were acquired during three consecutive seasons of the year (26 Sep. 1989, 22 Mar. 1990, and 7 Aug. 1990) over an area of the High Plains east of Greeley, Colorado. This region contains extensive eolian deposits in the form of stabilized dune complexes (small scale parabolic dunes superimposed on large scale longitudinal and parabolic dunes). Due to the dunes' large scale (2-10 km) and low relief (1-5 m), the scaling relationships that contribute to the evolution of this landscape are nearly impossible to understand without the use of remote sensing. Additionally, climate models indicate that the High Plains could be one of the first areas to experience changes in climate caused by either global warming or cooling. During the past 10,000 years there were at least three periods of extensive sand activity, followed by periods of landscape stability, as shown in the stratigraphic record of this area. Therefore, if the past is an

indication of the future, the monitoring of this landscape and its sensitive ecosystem is important for early detection of regional and global climate change.

Author (revised)

N94-20961*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

SUNPHOTOMETER NETWORK FOR MONITORING AEROSOL PROPERTIES IN THE BRAZILIAN AMAZON Abstract Only

BRENT N. HOLBEN, T. F. ECK (ST Systems Corp., Greenbelt, MD.), A. SETZER (Instituto de Pesquisas Espaciais, Sao Jose dos Campos, Brazil.), ALFREDO PEREIRA (Instituto de Pesquisas Espaciais, Sao Jose dos Campos, Brazil.), E. VERMOTE (Maryland Univ., College Park.), J. A. REAGAN (Arizona Univ., Tucson.), Y. A. KAUFMAN, D. TANRE (Lille-1 Univ., Villeneuve-d'Asoq, France.), and I. SLUTSKER (Science Systems and Applications, Inc., Greenbelt, MD.) *In INPE, The 7th Brazilian Remote Sensing Symposium, Volume 3* p 54-55 1993

Avail: CASI HC A01/MF A04

Satellite platforms have provided a methodology for regional and global remote sensing of aerosols. New systems will significantly improve that capability during the EOS era; however, the voluminous 20 year record of satellite data has produced only regional snapshots of aerosol loading and have not yielded a data base of the optical properties of those aerosols which are fundamental to our understanding of their influence on climate change. The prospect of fully understanding the properties of the aerosols with respect to climate change is small without validation and augmentation by ancillary ground based observations. Sun photometry was demonstrated to be an effective tool for ground based measurements of aerosol optical properties from fire emissions. Newer technology has expanded routine sun photometer measurements to spectral observations of solar aureole and almucantar allowing retrievals of size distribution, scattering phase function, and refractive index. A series of such observations were made in Brazil's Amazon basin from a network of six simultaneously recording instruments deployed in Sep. 1992. The instruments were located in areas removed from local aerosol sources such that sites are representative of regional aerosol conditions. The overall network was designed to cover the counter clockwise tropospheric circulation of the Amazon Basin. Spectral measurements of sun, aureole and sky data for retrieval of aerosol optical thickness, particle size distribution, and scattering phase function as well as measurements of precipitable water were made during noncloudy conditions.

Author (revised)

N94-21446 Office of Technology Assessment, Washington, DC. **DATA FORMAT STANDARDS FOR CIVILIAN REMOTE SENSING SATELLITES**

May 1993 22 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(PB93-192920) Avail: CASI HC A03

The Office of Technology Assessment (OTA) was asked by the Senate Armed Services Committee to investigate the plethora of formats for remotely sensed Earth data. At a workshop held on 2 Oct. 1992, participants discussed the pros and cons of standardizing formats for remote-sensed data, the question of how many different standards are needed, with what else should remote-sensed data be compatible, and who should set the standards. It was clear from the workshop that data from different sources are largely provided in different formats and on different media. Moreover, formats, media, and recording hardware for the same system have often changed over time leading to situations where old data is virtually inaccessible. Creating order out of the current chaos will be a very difficult proposition and is likely to cause problems for many suppliers and users of data. Nevertheless, the payoff for doing so may be sufficiently great to warrant a major effort in that direction. NTIS

N94-24357 Utah State Univ., Logan, UT. Coll. of Natural Resources. **MAPPING TOMORROW'S RESOURCES: A SYMPOSIUM ON THE USES OF REMOTE SENSING, GEOGRAPHIC INFORMATION SYSTEMS (GIS), AND GLOBAL POSITIONING**

43 EARTH RESOURCES AND REMOTE SENSING

SYSTEMS (GPS) FOR NATURAL RESOURCES MANAGEMENT
ALLAN FALCONER, ed. 1993 93 p Symposium held in Logan, UT, 23-24 Apr. 1992; sponsored by Utah State Univ., S. J. and Jesse E. Quinney Foundation, the Soil Conservation Service, the Fish and Wildlife Service, Forest Service, and Utah Geographic Alliance Its Natural Resources and Environmental Issues, Volume 2 (ISSN 1069-5370)

Copyright Avail: Issuing Activity (Quinney Library, Coll. of Natural Resources, Utah State Univ., Logan, UT 84322-5260)

The College of Natural Resources recognizes the important role it has in educating natural resources managers and leaders who can provide the guidance and knowledge needed to increase the production of the earth's renewable resources while sustaining and enhancing the global environment and the natural resource base. The College's teaching, research, extension, and service efforts focus on the many aspects of sustained multiple-natural-resources management and their relationship to man. Through its many programs, the College of Natural Resources focuses on solving local, state, national, and global problems to enhance a more efficient and contemporary use of the world's natural resources. Natural Resources and Environmental Issues (NREI) which began publication in 1993, is a technical series that addresses current topics relevant to natural resources and to the environment. The journal is published as a series of volumes, with at least one being issued each year as the proceedings of the Natural Resources Week Symposium. In the issue on Mapping Tomorrow's Resources, the following topics are discussed: Natural Resource Information from Monopoly to Competition; Global Resources and Mission to Planet Earth; Geographic Information Systems (GIS) Systems and Data Management for Global Data Sets in Natural Resources; the Global Resource Information Database; Overview of GIS Technology in Utah State Government; Politically Correct Global Mapping and Monitoring; Integrating Satellite Imagery and GIS into Natural Resources Management; Forest Service Applications of Remote Sensing and the National Training Program; the Position of the Global Positioning System (GPS) in Wildlife and Habitat Mapping; and the Bureau of Land Management's (BLM's) Remote Sensing Program in Utah. Derived from text

N94-25656# Army Topographic Engineering Center, Fort Belvoir, VA. THE POTENTIAL FOR THE DEPARTMENT OF DEFENSE TO USE SPACE-BASED REMOTE SENSING TO SUPPORT DOD AND OTHER GOVERNMENT AGENCIES' ENVIRONMENTAL PROGRAMS

DONALD R. ARTIS, JR. Dec. 1993 11 p (AD-A273895; TEC-R-198) Avail: CASI HC A03/MF A01

This paper describes the potential for the Department of Defense (DoD) to support other Government agencies in the management of national and worldwide environmental programs while continuing to conduct the traditional role of DoD as the military arm of the Federal Government. The DOD space-based remote sensing program must complement other programs, rather than replace or duplicate those programs. This may include defense-related remote sensing applying technologies to civil applications and environmental functions and ecological information needs; using DoD sensors for civil applications; and expanding the role of the Environmental Task Force (ETF). DTIC

N94-26236*# Miami Univ., FL. REMOTE EARTH SCIENCES DATA COLLECTION USING ACTS Final Report

ROBERT H. EVANS Oct. 1992 34 p (Contract NAGW-2330) (NASA-CR-195227; NAS 1.26:195227) Avail: CASI HC A03/MF A01

Given the focus on global change and the attendant scope of such research, we anticipate significant growth of requirements for investigator interaction, processing system capabilities, and availability of data sets. The increased complexity of global processes requires interdisciplinary teams to address them; the investigators will need to interact on a regular basis; however, it is unlikely that a single institution will house sufficient investigators with the required

breadth of skills. The complexity of the computations may also require resources beyond those located within a single institution; this lack of sufficient computational resources leads to a distributed system located at geographically dispersed institutions. Finally the combination of long term data sets like the Pathfinder datasets and the data to be gathered by new generations of satellites such as SeaWiFS and MODIS-N yield extra-ordinarily large amounts of data. All of these factors combine to increase demands on the communications facilities available; the demands are generating requirements for highly flexible, high capacity networks. We have been examining the applicability of the Advanced Communications Technology Satellite (ACTS) to address the scientific, computational, and, primarily, communications questions resulting from global change research. As part of this effort three scenarios for oceanographic use of ACTS have been developed; a full discussion of this is contained in Appendix B. Author

N94-29107 Rutherford Appleton Lab., Chilton (England). ROLE OF SATELLITE OBSERVATIONS OF SEA-SURFACE TEMPERATURE IN THE DETECTION OF GLOBAL CHANGE
M. R. ALLEN 28 Nov. 1993 51 p (PB94-138120; RAL-93-095) Avail: Issuing Activity (National Technical Information Service (NTIS))

The report presents the scientific case for the development of a 10-12 year data-set of consistent, accurate, global observations of sea surface temperature (SST) from the Along-Track Scanning Radiometer (ATSR) and its successors, the ATSR-2 and AATSR. The case focuses on the role such data will play in detecting and quantifying evidence for anthropogenic climatic change. Four key areas in which data from the ATSR series can play a useful role are identified. They are: providing high spatial and temporal resolution data for the validation of climate models; providing independent corroboration of in situ observations of SST; providing direct evidence of global changes taking place; and allowing the detection of global patterns of change extending into the Southern Hemisphere extra-tropical regions. NTIS

N94-31068 Office of Technology Assessment, Washington, DC. GLOBAL CHANGE RESEARCH AND NASA'S EARTH OBSERVING SYSTEM Background Paper
Nov. 1993 56 p See also PB93-231322, PB94-134640 and PB94-134657 Limited Reproducibility: More than 20% of this document may be affected by microfiche quality (PB94-126992; OTA-BP-ISC-122) Avail: CASI HC A04

The United States is spending billions of dollars in a multiyear Global Change Research Program (the USGCRP) to monitor, understand, and ultimately predict the nature of global changes and the mechanisms that cause them. The background report examines the direction and scope of USGCRP and its most expensive component, NASA's Earth Observing System (EOS) of satellites. In particular, it examines how well USGCRP and EOS are fulfilling their scientific objectives, whether some program elements are missing or need to be strengthened, and whether the program is meeting the needs of policymakers. The background paper describes the number of suggestions to improve the value of the USGCRP to both scientists and policymakers. The background paper also explicates the continuing debate over whether the sensors and satellites planned by USGCRP: (1) will be able to acquire data in sufficient detail to elucidate the mechanisms responsible for global change; and (2) are appropriate for long-term monitoring of key indices of global change. NTIS

N94-32465*# National Aeronautics and Space Administration. John C. Stennis Space Center, Bay Saint Louis, MS. REMOTE SENSING FOR URBAN PLANNING
BRUCE A. DAVIS, NICHOLAS SCHMIDT, JOHN R. JENSEN, DAVE J. COWEN, JOANNE HALLS, SUNIL NARUMALANI, and BRYAN BURGESS In NASA, Washington, Technology 2003: The Fourth National Technology Transfer Conference and Exposition, Volume 2 p 389-393 Feb. 1994
Avail: CASI HC A01/MF A04

Utility companies are challenged to provide services to a highly dynamic customer base. With factory closures and shifts in employment becoming a routine occurrence, the utility industry must develop new techniques to maintain records and plan for expected growth. BellSouth Telecommunications, the largest of the Bell telephone companies, currently serves over 13 million residences and 2 million commercial customers. Tracking the movement of customers and scheduling the delivery of service are major tasks for BellSouth that require intensive manpower and sophisticated information management techniques. Through NASA's Commercial Remote Sensing Program Office, BellSouth is investigating the utility of remote sensing and geographic information system techniques to forecast residential development. This paper highlights the initial results of this project, which indicate a high correlation between the U.S. Bureau of Census block group statistics and statistics derived from remote sensing data. Author

N94-32466* National Aeronautics and Space Administration. John C. Stennis Space Center, Bay Saint Louis, MS.

REMOTE SENSING AND THE MISSISSIPPI HIGH ACCURACY REFERENCE NETWORK

MARK MICK, TIMOTHY M. ALEXANDER, and STAN WOOLLEY
In NASA, Washington, Technology 2003: The Fourth National Technology Transfer Conference and Exposition, Volume 2 p 394-403 Feb. 1994

Avail: CASI HC A02/MF A04

Since 1986, NASA's Commercial Remote Sensing Program (CRSP) at Stennis Space Center has supported commercial remote sensing partnerships with industry. CRSP's mission is to maximize U.S. market exploitation of remote sensing and related space-based technologies and to develop advanced technical solutions for spatial information requirements. Observation, geolocation, and communications technologies are converging and their integration is critical to realize the economic potential for spatial informational needs. Global positioning system (GPS) technology enables a virtual revolution in geographically accurate remote sensing of the earth. A majority of states are creating GPS-based reference networks, or high accuracy reference networks (HARN). A HARN can be defined for a variety of local applications and tied to aerial or satellite observations to provide an important contribution to geographic information systems (GIS). This paper details CRSP's experience in the design and implementation of a HARN in Mississippi and the design and support of future applications of integrated earth observations, geolocation, and communications technology.

Author (revised)

N94-33598* Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.

A COLLECTION OF THE MOVIES (Videotape)

28 Mar. 1991 Videotape: 21 min. 52 sec. playing time, in color, with sound

(NASA-TM-109806; NONP-NASA-VT-94-12934) Avail: CASI VHS A01/BETA A22

This video contains computer-generated animation made from still data sets processed by computer to give the illusion of flying around the objects. 'Earth the Movie' uses cloud data from satellites and geographical data from maps. 'LA the Movie' was taken from Landsat data of the Los Angeles area. This was the first experimental demonstration of the technology. 'Mars the Movie' was taken from Viking orbiter data. 'Miranda' the Movie was made from a mosaic of 9 frames taken by Voyager of the Uranian moon, Miranda. The last movie is 'Monterey the Bay'.

CASI

N94-34018* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

THE PAYLOAD ADVISORY PANEL AND THE DATA AND INFORMATION SYSTEM ADVISORY PANEL OF THE INVESTIGATORS WORKING GROUP OF THE EARTH OBSERVING SYSTEM: A JOINT REPORT

BERRIEN MOORE, III (New Hampshire Univ., Durham.), JEFF DOZIER (California Univ., Santa Barbara.), ERIC J. BARRON

(Pennsylvania State Univ., State College.), GETULIO BATISTA (Instituto de Pesquisas Espaciais, Sao Jose dos Campos, Brazil.), PETER BREWER (Monterey Bay Aquarium Research Inst., Pacific Grove, CA.), WILLIAM GROSE, GRAHAM HARRIS, DENNIS HARTMANN, WILLIAM LAU, JOHN LEMARSHALL et al. 17 Dec. 1993 99 p Panel held in Herndon, VA, 4-6 Oct. 1993 Prepared in cooperation with New Hampshire Univ., Durham; California Univ., Santa Barbara, CA; Pennsylvania State Univ., State College; INPE, San Jose dos Campos, Brazil; Monterey Bay Aquarium Research Inst., Pacific Grove, CA; CSIRO, Canberra, Australia; Washington Univ., Seattle; NASA. Goddard Research Center; and Bureau of Meteorology, Melbourne, Australia

(NASA-TM-109847; NAS 1.15:109847) Avail: CASI HC A05/MF A02

The Payload Advisory Panel of the Investigators Working Group (IWG) for the Earth Observing System (EOS) met 4 to 6 October 1993 in Herndon, Virginia. The Panel, originally composed of the Interdisciplinary Science Principal Investigators, was expanded to include all Principal Investigators and as such is now the IWG itself. The meeting also addressed directly a report from the EOS Data and Information System (EOSDIS) Advisory Panel. The meeting focused on payload issues in the years 2000 to 2005; however, some subjects in the nearer-term, most significantly EOSDIS, were considered. The overarching theme of convergence in Earth observations set a backdrop for the entire meeting. Other themes included: atmospheric chemistry; remote sensing of the global cycles of energy, water, and carbon in EOS; ocean and land-ice altimetry; and the EOSDIS. The Total Solar Irradiance Monitoring Report and results from the Accelerated Canopy Chemistry Program are included as appendices.

Derived from text

N83-70161 Institut Geographique National, Paris (France).

SPACE IMAGERY PROCESSING: METHODS AND APPLICATIONS AT THE I.G.N. - FRANCE

J. DENEGRE, J.C. LUMMAUX, and J. POULAIN 1981 7 p In FRENCH; ENGLISH summary Presented at the Dixieme Conf. Intern. de l'Association Cartographique Intern., Tokyo, 25 Aug. - 1 Sep. 1980 Original document contains color illustrations

N84-74448 European Space Research Organization, Paris (France).

UTILISATION OF SPACELAB FOR REMOTE SENSING OF EARTH RESOURCES

1974 72 p Presented at the Appl. Summer Study of the National Academy of Engineering, Snowmass, Colo., 30 Jun. - 13 Jul. 1974 refs

N84-74962* National Conference of State Legislatures, Denver, CO.

HIGHLIGHTS OF THE NATIONAL CONFERENCE OF STATE LEGISLATURES: LEGISLATIVE WORKSHOP ON STATE USES OF SATELLITE REMOTE SENSING NO. 3 Summary Report

21 Oct. 1977 84 p Conf. held at Clayton, Missouri, 20-21 Oct. 1977 Sponsored by NASA refs
(NASA-CR-173790; NAS 1.26:173790) Avail: CASI HC A05

N85-73372* Washington Univ., Saint Louis, MO. Center for Development Technology.

PROGRAM ON EARTH OBSERVATION DATA MANAGEMENT SYSTEMS (EODMS) Quarterly Status and Technical Progress Report, 22 Aug. - 21 Nov. 1975

L. F. EASTWOOD, JR., J. K. GOHAGAN, C. T. HILL, R. P. MORGAN, S. M. BAY, T. K. FOUTCH, T.R. HAYS, R. J. BALLARD., and M. A. POWER 1975 33 p refs
(Contract NAS5-20680)

(NASA-CR-175990; NAS 1.26:175990) Avail: CASI HC A03

N85-73373* Washington Univ., Saint Louis, MO. Center for Development Technology.

PROGRAM ON EARTH OBSERVATION DATA MANAGEMENT SYSTEMS (EODMS) Quarterly Status and Technical Progress Report, 22 May - 21 Aug. 1975

43 EARTH RESOURCES AND REMOTE SENSING

L. F. EASTWOOD, JR., J. K. GOHAGAN, C. T. HILL, R. P. MORGAN, S. M. BAY, T. K. FOUTCH, T.R. HAYS, G. T. OSNER, and M. A. POWER 1975 102 p refs
(Contract NAS5-20680)
(NASA-CR-175993; NAS 1.26:175993) Avail: CASI HC A06

N85-73661* Washington Univ., Saint Louis, MO. Center for Development Technology.

PROGRAM ON EARTH OBSERVATION DATA MANAGEMENT SYSTEMS (EODMS). PRELIMINARY NEEDS ANALYSIS REPORT, PART 2 Report. 1 Jun. 1975 - 31 Dec. 1975

L. F. EASTWOOD, JR., J. K. GOHAGAN, C. T. HILL, R. P. MORGAN, S. M. BAY, T. K. FOUTCH, T.R. HAYS, P. H. ROYSE, R. J. BALLARD, K. P. MAKIN et al. 31 Dec. 1975 312 p refs 3 Vol.

(Contract NAS5-20680)

(NASA-CR-175973; NAS 1.26:175973) Avail: CASI HC A14

N85-73662* Washington Univ., Saint Louis, MO. Center for Development Technology.

PROGRAM ON EARTH OBSERVATION DATA MANAGEMENT SYSTEMS (EODMS). PRELIMINARY NEEDS ANALYSIS REPORT Summary Report

L. F. EASTWOOD, JR., J. K. GOHAGAN, C. T. HILL, R. P. MORGAN, S. M. BAY, T. K. FOUTCH, T.R. HAYS, P. H. ROYSE, R. J. BALLARD, K. P. MAKIN et al. 17 Feb. 1976 43 p
(Contract NAS5-20680)

(NASA-CR-175981; NAS 1.26:175981) Avail: CASI HC A03

N85-73664* Washington Univ., Saint Louis, MO. Center for Development Technology.

PROGRAM ON EARTH OBSERVATION DATA MANAGEMENT SYSTEMS (EODMS). PRELIMINARY NEEDS ANALYSIS REPORT, PART 3 Report. 1 Jun. 1974 - 31 Dec. 1975

L. F. EASTWOOD, JR., J. K. GOHAGAN, C. T. HILL, R. P. MORGAN, S. M. BAY, T. K. FOUTCH, T.R. HAYS, P. H. ROYSE, R. J. BALLARD, K. P. MAKIN et al. 31 Dec. 1975 198 p refs 3 Vol.

(Contract NAS5-20680)

(NASA-CR-175991; NAS 1.26:175991) Avail: CASI HC A09

N86-71872* Lockheed Electronics Co., Houston, TX.

A DETAILED PROCEDURE FOR THE USE OF SMALL SCALE PHOTOGRAPHY IN LAND USE CLASSIFICATION

P. L. VEGAS, G. SHELTON, L. W. ERICKSON, P. DAVIS, B. E. ARTHUR, and G. HAMPTON 1986 52 p
(Contract NAS9-11584)

(NASA-CR-176668; NAS 1.26:176668; ERL-031) Avail: CASI HC A04

N90-70417 National Space Development Agency, Saitama (Japan). Earth Observation Center.

PROCESSING AND ANALYSIS EVALUATION OF SAR-580 DATA AND MOS-1 AIRBORNE VERIFICATION DATA

KOREHIRO MAEDA 5 Jun. 1986 38 p In JAPANESE; ENGLISH summary Presented at NASDA's 2nd Technical Symposium, Tokyo, Japan, 5 Jun. 1986

(NASDA-CP-03-8; JTN-88-80013) Avail: CASI HC A03

N90-70833* National Aeronautics and Space Administration, Washington, DC.

LINKING REMOTE-SENSING TECHNOLOGY AND GLOBAL NEEDS: A STRATEGIC VISION Executive Summary

Apr. 1987 31 p Limited Reproducibility: More than 20% of this document may be affected by color photographs Original contains color illustrations

(NASA-TM-101849; NAS 1.15:101849) Avail: CASI HC A03; 22 functional color pages

N91-70662*# National Aeronautics and Space Administration, Washington, DC.

THE EARTH OBSERVING SYSTEM

1991 40 p Original contains color illustrations

(NASA-TM-102942; NAS 1.15:102942) Avail: CASI HC A03; 21 functional color pages

N93-72477*# National Academy of Sciences - National Research Council, Washington, DC. Space Studies Board.

ASSESSMENT OF SATELLITE EARTH OBSERVATION PROGRAMS

1991 76 p

(Contract NASW-4102)

(NASA-CR-193279; NAS 1.26:193279) Avail: CASI HC A05/MF A01

During the past decade, the Space Studies Board, its Committee on Earth Studies (CES), and other bodies of the National Research Council have provided the federal government with a substantial body of advice on the study of the Earth from space. Together, these documents have contained an overall strategy for science and applications using Earth observation spacecraft and have established a set of specific recommendations for implementation of the strategic advice. This report assesses the status of the nation's civil Earth observation programs in relation to this existing body of advice and provides additional advice on how to address the unfulfilled objectives and recommendations in the current scientific and programmatic context. Specifically, the report reviews the content of the satellite Earth observation programs of the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and the Landsat system operated by the Earth Observation Satellite (EOSAT) Company as of the spring of 1991. The NASA programs are within the agency's Mission to Planet Earth initiative, which includes the Earth Observing System (EOS) and its related data and information system, the Earth Probe small- and moderate-size mission line, and a number of 'precursor' missions such as the Upper Atmosphere Research Satellite (UARS) and the Ocean Topography Experiment (TOPEX/Poseidon). The NOAA programs include the two meteorological satellite series, the Polar-Orbiting Operational Environmental Satellites (POES), and the Geostationary Operational Environmental Satellites (GOES). Also considered in this assessment are some of the Defense Department's operational and experimental spacecraft, including the Defense Meteorological Satellite Program (DMSP), the Global positioning system, and the completed Geosat mission. Finally, because the US programs should be viewed in the broader international context, the experimental, operational, and commercial satellite programs of other countries are also discussed briefly.

Derived from text

N94-70142*# National Aeronautics and Space Administration, Washington, DC.

LINKING REMOTE-SENSING TECHNOLOGY AND GLOBAL NEEDS: A STRATEGIC VISION

Jun. 1987 90 p Original contains color illustrations

(NASA-TM-109214; NAS 1.15:109214) Avail: CASI HC A05/MF A01; 8 functional color pages

The Applications Working group reports on the proposed Applications Strategy. The strategy fosters and encourages use of space data to resolve a myriad of practical problems affecting mankind's survival on Earth, as well as to provide help with the daily decisions affecting individuals' livelihood in many fields. The overall goal of the Working Group is to develop and demonstrate, by the end of the next decade, integrated information systems that will allow private industry, operational agencies, and scientific research communities to exploit effectively the data taken by Earth-observing satellites. The objectives include renewable land resources, renewable forest resources, nonrenewable strategic resources, and ocean/atmosphere objectives that are designed to provide advances in long-range weather and short-range climate forecasting capability. The key to major advances in the application of remote sensing is the information system. The information system and user requirements determine the transfer of technology to achieve the Working Group's goal. The objectives and the information system architecture are detailed in this report.

Derived from text

N94-71229*# Mississippi Univ., University, MS. Dept. of Sociology and Anthropology.

SETTLEMENT PATTERNS, GIS, REMOTE SENSING, AND THE LATE PREHISTORY OF THE BLACK PRAIRIE IN EAST CENTRAL MISSISSIPPI

JAY K. JOHNSON /In NASA. Stennis Space Center, Applications of Space-Age Technology in Anthropology p 111-120 1 May 1991 Sponsored by National Geographic Society and National Endowment for the Humanities

Avail: CASI HC A02/MF A03; 20 functional color pages

Data recovered as the result of a recent field project designed to test a model of the distribution of protohistoric settlement in an unusual physiographic zone in eastern Mississippi are examined using GIS based techniques to manipulate soil and stream distance information. Significant patterning is derived. The generally thin soils and uniform substratum of the Black Prairie in combination with a distinctive settlement pattern offer a promising opportunity for the search for site specific characteristics within airborne imagery. Landsat TM data provide information on modern ground cover which is used as a mask to select areas in which a multivariate search for archaeological site signatures within a TIMS image is most likely to prove fruitful.

Author

45

ENVIRONMENT POLLUTION

Includes atmospheric, noise, thermal, and water pollution.

N84-16656*# Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.

GLOBAL CHANGE: A BIOGEOCHEMICAL PERSPECTIVE

M. MCELROY 15 Jul. 1983 39 p Workshop held at Cambridge, Mass. and Pasadena, Calif., Jan. and Feb. 1983 Prepared in cooperation with Harvard Univ. refs

(Contract NAS7-918; RTOP 188-41-57-02)

(NASA-CR-173210; JPL-PUB-83-51; NAS 1.26:173210) Avail: CASI HC A03/MF A01

A research program that is designed to enhance our understanding of the Earth as the support system for life is described. The program change, both natural and anthropogenic, that might affect the habitability of the planet on a time scale roughly equal to that of a human life is studied. On this time scale the atmosphere, biosphere, and upper ocean are treated as a single coupled system. The need for understanding the processes affecting the distribution of essential nutrients—carbon, nitrogen, phosphorous, sulfur, and water—within this coupled system is examined. The importance of subtle interactions among chemical, biological, and physical effects is emphasized. The specific objectives are to define the present state of the planetary life-support system; to elucidate the underlying physical, chemical, and biological controls; and to provide the body of knowledge required to assess changes that might impact the future habitability of the Earth.

Author

N87-22313# National Academy of Sciences - National Research Council, Washington, DC. US Committee for an International Geosphere-Biosphere Program.

GLOBAL CHANGE IN THE GEOSPHERE-BIOSPHERE: PRIORITIES FOR AN IGBP (INTERNATIONAL GEOSPHERE-BIOSPHERE PROGRAM) Final Report

1986 103 p

(Contract DE-FG05-84ER-60277)

(DE87-005034; DOE/ER-60277/T1) Avail: CASI HC A06/MF A02

A program is defined that would attempt to understand the workings of the Earth and the living organisms on it as a coupled system - a challenge in science that holds the promise of elucidating many of the global concerns of the present day. It would require the participation of many nations and draw upon the efforts of many fields of science. It would be made up of an array of planned,

cooperative programs of observation, modeling, and process studies with organized opportunities for joint discussion and interpretation. It would lean on spaceborne observations for global perspective, but it is not a space program, for the preponderance of needed science would deal with processes of change, and vast majority of necessary measurements would need be made on the ground and on the oceans, from within the habitat of life. As an international program it would stand as a separate, focused endeavor that interacts with related, disciplinary programs to increase their effectiveness but without attempting to subsume them or to dictate their goals.

DOE

N88-19021# International Council of Scientific Unions, Paris (France).

INTERNATIONAL GEOSPHERE-BIOSPHERE PROGRAM: A STUDY OF GLOBAL CHANGE Final Report

4 Aug. 1986 27 p

(PB88-142393) Avail: CASI HC A03/MF A01

A better understanding of the Earth and its immediate environment is essential if the ability to detect and to respond to warnings of significant global change are to be improved. Although the world community of scientists has in the last 30 years successfully completed a wide range of international programs. The program will be tightly focused, with emphasis on interactive processes that are not addressed by other existing programs. Topics suggested for early emphasis in the IGBP include: studies of biogeochemical cycles; studies of the ocean euphotic zone; studies of soil dynamics and soil chemistry; and studies of variable solar inputs to the Earth. Emphasis is also put on the need for development of an adequate global data and information system, that must be an integral part of the program.

NTIS

N88-27650*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

THE DETECTION AND INTERPRETATION OF LONG-TERM CHANGES IN OZONE FROM SPACE

JOHN E. FREDERICK (Chicago Univ., IL.), XUFENG NIU (Chicago Univ., Ill.), and ERNEST HILSENATH 1988 10 p

(Contract NAG5-873)

(NASA-TM-101135; NAS 1.15:101135) Avail: CASI HC A02/MF A01

Long-term measurements of backscattered ultraviolet radiances, now being acquired by orbiting monochromators, will provide the basis for seeking trends in atmospheric ozone. The unambiguous detection of ozone trends on decadal time scales demands a data set that is essentially free of instrument drifts. Periodic flights of an ultraviolet monochromator on the space shuttle will provide an independent means of evaluating the long-term stability of identical instruments operating on free-flying satellites. A successful calibration of the free-flying sensors using the shuttle instrument places strict demands on calibration repeatability from one flight to the next. In addition, spatial and temporal variability in cloud cover could pose further complications in carrying out these in-flight calibrations.

Author

N90-12980*# National Academy of Sciences - National Research Council, Washington, DC. Committee on Global Change.

TOWARD AN UNDERSTANDING OF GLOBAL CHANGE: INITIAL PRIORITIES FOR US CONTRIBUTIONS TO THE INTERNATIONAL GEOSPHERE-BIOSPHERE PROGRAM Final Report

Dec. 1988 226 p Sponsored by NASA, Washington, DC; NOAA, Rockville, MD and Geological Survey, Reston, VA

(Contract NSF OCE-87-13699)

(NASA-CR-185873; NAS 1.26:185873; PB89-231344) Avail: CASI HC A11/MF A03

A limited number of high-priority research initiatives are recommended for early implementation as part of the U.S. contribution to the preparatory phase of the International Geosphere-Biosphere Program. The recommendations are based on the committee's analysis of the most critical gaps in the scientific knowledge needed to understand the changes that are occurring in the earth system not

45 ENVIRONMENT POLLUTION

being addressed by existing programs. The report articulates a number of important key issues and interactions that characterize global change in the geosphere-biosphere system on time scales of decades to centuries; identifies the knowledge that is the most urgently needed to improve understanding of those issues and interactions; and formulates initial priorities for initial U.S. contributions to the IGBP, recognizing the contributions of other ongoing and proposed programs. Author

N90-12981# Systems Applications, Inc., San Rafael, CA.
SENSITIVITY OF A REGIONAL OXIDANT MODEL TO VARIATIONS IN CLIMATE PARAMETERS, VOLUME 1 AND 2 Final Report

R. E. MORRIS, M. W. GERY, M. K. LIU, G. E. MOORE, C. DALEY, and S. M. GREENFIELD Jul. 1989 149 p Sponsored by EPA, Research Triangle Park, NC (PB89-224943; EPA/600/3-89/068-VOL-1/2) Avail: CASI HC A07/MF A02

In order to investigate the sensitivity of ozone concentrations to future climate variations, a regional oxidant model was applied for future climate scenarios to two regions: one covering central California (San Joaquin Valley, Sierra Nevada mountains and the San Francisco Bay Area) and the other covering the midwestern and southeastern United States. Based on model calculations, the effects of increased temperature on ambient ozone concentrations results in an increase of the area of exceedances of the ozone air quality standard, a movement of the peak ozone concentration closer to the urban areas, and the resultant increase in the exposure of people to harmful levels of ozone concentrations. The calculations for California indicate that the maximum daily ozone concentrations may increase from 2 to 20 percent and the number of people exposed to hourly ozone concentrations in excess of the air quality standard may triple as a result of a temperature increase. Similar, although less dramatic, results were seen for the midwestern and southeastern applications. NTIS

N90-14715# Lawrence Livermore National Lab., Livermore, CA.
Atmospheric and Geophysical Sciences Div.

CLIMATE PROJECTIONS WITH REGIONAL RESOLUTION

MICHAEL C. MACCRACKEN Aug. 1989 15 p

(Contract W-7405-ENG-48)

(DE90-000858; UCID-21769) Avail: CASI HC A03/MF A01

The increasing atmospheric concentrations of carbon dioxide and other radiatively active gases will enhance the ability of the atmosphere to trap infrared radiation and thereby lead to warming of the climate. Numerical models suggest that the global average surface air temperature can be expected to increase a few degrees during the twenty-first century. This estimate is probably uncertain by a factor of at least two. The uncertainties in estimates of regional changes of temperature and precipitation are even greater. Despite these uncertainties, there is broad agreement that the persistence of such changes would be unprecedented in historical times. DOE

N90-14723# Department of Energy, Washington, DC. Office of Health and Environmental Research.

CARBON DIOXIDE AND CLIMATE: SUMMARIES OF RESEARCH IN FY 1989

Oct. 1989 87 p

(DE90-001791; DOE/ER-0425) Avail: CASI HC A05/MF A01

Scientific and public interest in greenhouse gases, climate warming, and global change has virtually exploded in 1989. The Department's focused research on CO₂ contributed sound and timely scientific information to the myriad of questions produced by the groundswell of interest and concern. Research projects summarized provided the data base that made timely responses possible, and the contributions from participating scientists are genuinely appreciated. The nation's interest has been well served. In the past year, the core CO₂ research has continued to improve the scientific knowledge needed to project future atmospheric CO₂ concentrations, to estimate climate sensitivity, and to assess the responses of

vegetation to rising concentrations of CO₂ and climate change. The Carbon Dioxide Research Program's goal is to develop sound scientific information for policy formation and governmental action in response to changes of atmospheric CO₂. During this year, the Program was moved into the Office of Health and Environmental Research and was combined with other atmospheric research activities. The work is now administered by the Atmosphere and Climate Research Division (ACRD). In addition to supporting core CO₂ research and developing a program around the new initiatives, ACRD is responsible for atmospheric science and climate. Its scope includes atmospheric chemistry, numerical modeling, laboratory studies, and field experiments. This Program Summary describes projects funded by the Carbon Dioxide Research Program during FY 1989 and gives a brief overview of the objectives, organization, and accomplishments of that research. DOE

N90-14724# Argonne National Lab., IL.

US ENERGY USE: NEW TECHNOLOGIES AND POLICIES IN RESPONSE TO GLOBAL WARMING

D. G. STREETS, C. N. BLOYD, and D. M. KENSKI Jun. 1989 39 p Presented at the Conference on Responding to the Threat of Global Warming: Options for the Pacific and Asia, Honolulu, HI, 21-27 Jun. 1989

(Contract W-31-109-ENG-38)

(DE90-002170; CONF-8906244-1) Avail: CASI HC A03/MF A01

Energy use and production accounts for by far the largest portion of emissions of greenhouse gases in the United States and the world. The US Environmental Protection Agency (EPA) has estimated that, worldwide, these activities were responsible for 57 percent of greenhouse warming in the 1980s. Other activities and their respective contributions include agriculture, 14 percent; land use and modification, 9 percent; chlorofluorocarbon (CFC) use, 17 percent; and other (nonenergy) industry, 3 percent. Given this importance of energy activities, it is appropriate that efforts to forestall global warming have focused on these activities. Because the United States consumes the largest share of world energy and thus produces the largest share of greenhouse gas emissions, it is the target of many such efforts. A number of U.S. government responses to global warming have been proposed or are now under way. For example, the 101st Congress has seen 11 bills dealing with global warming issues; a research program on climate change has been promised \$190 million for 1990; and the United States has signed the Montreal Protocol to control CFCs. U.S. energy and related emissions of greenhouse gases is discussed. Energy use in each sector is briefly characterized and several new technologies for energy use in that sector are described. Finally, national and state policies that offer potential to reduce energy use are discussed. This discussion is limited by space considerations to only a sampling of the many technologies under development and policy options that have been proposed. DOE

N90-15540# Oak Ridge National Lab., TN. Environment Sciences Div.

GLOBAL CLIMATE CHANGE AND NEPA (NATIONAL ENVIRONMENTAL POLICY ACT) ANALYSES

ROBERT M. CUSHMAN, DONALD B. HUNSAKER, JR., MARTHA S. SALK, and ROBERT M. REED 1989 25 p Presented at the The Scientific Challenge of NEPA: Future Directions Based on 20 Years of Experience, Knoxville, TN, 24-27 Oct. 1989

(Contract DE-AC05-84OR-21400)

(DE90-003704; CONF-891098-4) Avail: CASI HC A03/MF A01

Energy production and use, industrial activity, and land-use change are expected to cause a global climate change that would have local and regional manifestations during the next century. Although the resulting impacts are not yet known with certainty, potential effects on agriculture, water, forests, ecosystems, fisheries, coastal areas (from rising sea level), and other environmental resources have been predicted. The National Environmental Policy Act of 1969 (NEPA) provides for consideration of such topics as global climate change. However, the implementation of the environmental impact statement (EIS) requirements of NEPA has seldom

been used to address the issue. Climate change and its consequent effects have three important implications for NEPA determinations: (1) the potential for an action to individually alter climate must be assessed, (2) cumulative impacts of the action in concert with other actions must be considered, and (3) the potential for future climate change to alter the baseline environment (and thus to affect the action or to alter the impact of the action) must be assessed, even if the action under consideration will not in itself contribute to climate change. In this paper, we evaluate the climate-change issue (including the uncertainty of the temporal and spatial distribution of impacts) in a NEPA context. We discuss the kinds of actions to which NEPA is applicable, the types of analyses that might be appropriate, and the problems they might involve. In particular, the opportunities and limitations under current Council on Environmental Quality regulations for addressing climate change through the environmental assessment (EA)/EIS process are addressed. We also discuss changes that have been proposed for NEPA and its implementing regulation and how they could affect the analysis of global climate change. DOE

**N90-15541# Argonne National Lab., IL.
GLOBAL CLIMATE CHANGE: A FOSSIL ENERGY
PERSPECTIVE**

ROBERT KANE (Department of Energy, Washington, DC.) and DAVID W. SOUTH 1989 7 p Presented at the 6th International Coal Trade, Transportation and Handling Conference, London, England, 16-18 Oct. 1989 (Contract W-31-109-ENG-38)

(DE90-003770; CONF-891080-1) Avail: CASI HC A02/MF A01

Global climate change has attracted considerable attention recently as an emerging environmental problem. While substantial uncertainties still exist regarding the ability to accurately predict climate change, some scientists and policymakers believe immediate action is required. As a result, legislative proposals have been introduced and policies/programs proposed to address the perceived problem. Since fossil fuel combustion has been identified as a major contributor to the growth in atmospheric greenhouse gases, curtailing the emissions from fossil-fired facilities is a primary focus of many proposals. This paper discusses global climate change from a fossil, energy development and utilization perspective and demonstrates that if it is determined that greenhouse gas emissions should be reduced, fossil fuels and fossil-fuel-based technologies can, and must, play a role. DOE

**N90-16356# Environmental Protection Agency, Washington, DC.
Office of Research and Development.**

SCIENTIFIC LINKAGES IN GLOBAL CHANGE

PETER R. JUTRO, ROBERT C. WORREST, and ANTHONY C. JANETOS 16 Jun. 1989 18 p Sponsored by Air and Waste Management Association, Pittsburgh, PA

(PB90-112608; EPA/600/D-89/126) Avail: CASI HC A03/MF A01

In the atmosphere, certain trace gases both promote global warming and deplete the ozone layer. The primary radiatively active trace gases which affect global warming are carbon dioxide, nitrous oxide, chlorofluorocarbons, methane, and tropospheric ozone. In the troposphere, the atmosphere up to 10 miles above the earth's surface, these compounds function as greenhouse gases. Many of these gases also influence the concentration of ozone in the stratosphere, the atmospheric layer located between 10 to 30 miles above the earth's surface. The diffuse layer of ozone in the stratosphere protects life on earth from harmful solar radiation. A reduction of the layer could have very important impacts on the earth's systems. Interactions exist in various ecological processes as well. Physical, chemical, and biological activities of plants and animals are affected directly by global climate change and by increased ultraviolet radiation resulting from depletion of stratospheric ozone. NTIS

N90-16364# Sandia National Labs., Albuquerque, NM. Strategic Technologies Div.

A QUALITATIVE ARCHITECTURE FOR UNDERSTANDING

POLICY RESPONSES TO GLOBAL CHANGE

DENNIS ENGI 1989 8 p Presented at the 9th Miami International Congress on Energy and Environment, Miami Beach, FL, 11-13 Dec. 1989

(Contract DE-AC04-76DP-00789)

(DE90-003936; SAND-89-1338C; CONF-891210-2) Avail: CASI HC A02/MF A01

An architecture is presented which will provide qualitative clarification of the principal cause-and-effect relationships among various policy options and the resulting impacts on anthropogenic greenhouse gas emissions. A fundamental product of analyzing the Global Change issue in the context of this architecture is the conceptual identification and internalization of conventionally external costs. The robust policy portfolios which evolve from this analysis will, by design, recognize the international dimension and be driven by adaptive incrementalism in order to avoid ill-conditioned and/or major, short-term, infrastructural changes to the energy systems. DOE

**N90-18813# Corvallis Environmental Research Lab., OR.
EFFECTS OF GLOBAL CLIMATE CHANGE ON AGRO-
ECOSYSTEMS: SCOPE OF WORK**

DONALD L. PHILLIPS Aug. 1989 23 p

(PB90-120023; EPA/600/3-89/076) Avail: CASI HC A03/MF A01

The U.S. Environmental Protection Agency, Office of Research and Development (ORD), is initiating a Global Climate Change Program to evaluate the potential environmental effects of climate change. The document describes one project, Effects of Global Climate Change on Agroecosystems, which will be administered at the EPA Environmental Research Laboratory-Corvallis as part of the ORD program. The document describes the areas in which research will be undertaken in the project over the next five years. It also presents the scientific questions that must be addressed in order to answer important public policy needs concerning the potential environmental effects of global climate change on agroecosystems and it describes the general research approaches that will be used to answer the scientific questions. NTIS

**N90-28142# Environmental Protection Agency, Ann Arbor, MI.
Office of Air and Radiation.**

**OPTIONS FOR CONTROLLING THE GLOBAL WARMING
IMPACT FROM MOTOR VEHICLES**

ROBERT M. HEAVENRICH, J. D. MURRELL, and KARL H. HELLMAN Dec. 1989 23 p

(PB90-161688; EPA/AA/CTAB-89/08) Avail: CASI HC A03/MF A01

There is a great deal of interest in the subject of global warming and potential ways to mitigate the impacts of emissions that contribute to it. Ways are discussed to formulate approaches that could be involved in a regulatory program for control of carbon dioxide emissions from cars and light trucks. Author

**N90-28146# Environmental Protection Agency, Washington, DC.
Office Policy, Planning, and Evaluation.**

**POLICY OPTIONS FOR STABILIZING GLOBAL CLIMATE.
VOLUME 1: CHAPTERS 1-6 Draft Report**

DANIEL A. LASHOF, ed. and DENNIS A. TIRPAK, ed. Feb. 1989 408 p

(PB90-182304) Avail: CASI HC A18/MF A04

A general introduction is provided to the climate change issue and selected previous studies are reviewed. The greenhouse gases, their sources and sinks, chemical properties, current atmospheric concentrations and distributions, and the relation of greenhouse gases to the processes of climatic change are discussed. Once this link is made, those human activities that affect trace-gas emissions and ultimately influence climate change are examined. The scenarios developed to assist in thinking about possible future emissions and climate change are discussed and then sensitivity analyses are presented of the modeling results. A detailed description is given of existing and emerging technologies that should be considered in the formulation of a comprehensive strategy for mitigating global

45 ENVIRONMENT POLLUTION

warming. Domestic policy options, and international mechanisms for responding to climate change are discussed. Author

N90-28907# Office of Science and Technology, Washington, DC. **OUR CHANGING PLANET: THE FY 1991 US GLOBAL CHANGE RESEARCH PROGRAM. A REPORT BY THE COMMITTEE ON EARTH SCIENCES TO ACCOMPANY THE FY 1991 BUDGET** Jan. 1990 71 p

(PB90-202623) Avail: CASI HC A04/MF A01

Although the Earth has been changing for millions of years, dramatic recent changes such as antarctic ozone depletion demonstrate that human activities are affecting the Earth system. Because of the high priority attached to the U.S. Global Change Research Program, the President is proposing \$1,034 million for the research effort in the FY 1991 budget, a \$374.8 million or 57 percent increase over the FY 1990 level. Summarized here are the key features and budget of the proposed U.S. Global Change Research Program for FY 1991. A more detailed FY 1991 research plan will be released in the spring of 1990. NTIS

N90-28918# Argonne National Lab., IL. **RESPONDING TO THE THREAT OF GLOBAL WARMING: OPTIONS FOR THE PACIFIC AND ASIA**

DAVID G. STREETS, ed. and TOUFIC A. SIDDIQI, ed. 1989 526 p Presented at the Responding To the Threat of Global Warming: Options for the Pacific and Asia, Honolulu, HI, 21-27 Jun. 1989 (Contract W-31-109-ENG-38) (DE90-014756; ANL/EAIS/TM-17; CONF-8906244) Avail: CASI HC A23/MF A04

The primary goal of the workshop was to explore the options that the countries of the Pacific and Asia have for dealing with the threat of global warming. The countries of the Pacific and Asia must address a variety of issues related to global warming, ranging from determining the advisability of reducing greenhouse-gas emissions to assessing the vulnerability of various communities to the consequences of climate change only adds to the many other important health and socioeconomic problems they must face. The goal of this workshop was to bring together policy makers, scientists, and analysts who are concerned about the issue of climate change in this region so they could begin to develop information that will help decision makers formulate rational policy alternatives. Four principal areas of discussion: the current state of knowledge about global climate change and its likely consequences; energy policy options for slowing the expected growth in emissions of greenhouse gases; mitigation measures to cope with the impacts (including impacts related to agriculture and sea-level rise), should they occur, and research needs to assist decision makers in the Pacific and Asia. This volume compiles the proceedings of the workshop. DOE

N91-10394# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation. **POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX C: AGRICULTURE, VOLUME 1 Final Report**

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 302 p (PB90-171588; EPA/230/05-89/053-APP-C-VOL-1) Avail: CASI HC A14/MF A03

Back-up research studies are presented for the Potential Effects of Global Climate Change on the United States report for Congress (1989). Volume 1 of the studies presents simulated potential effects of global climate change on agriculture in the Great Lakes Region, the Southeastern United States, California, and the Great Plains States. Economic and water irrigation effects for particular regions are included. Author

N91-10395# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation. **POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX A: WATER RESOURCES Final Report**

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 333 p (PB90-171968; EPA/230/05-89/051-APP-A) Avail: CASI HC A15/MF A03

Areas of discussion are: interpretation of hydrologic effects of climate change in the Sacramento-San Joaquin River Basin, methods for evaluating the potential impacts of global climate change in California and Georgia; impacts of climate change on the salinity of San Francisco Bay; effects of climate changes on the Laurentian Great Lakes levels; the impact of global warming on the Great Lakes' ice cycles; potential climate changes to the Lake Michigan thermal structure; effects of climate warming on Lake Erie water quality; impacts of global warming on runoff in the upper Chattahoochee River Basin; and potential impacts of climate change on the Tennessee Valley Authority Reservoir System. Author

N91-10396# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation. **POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX B: SEA LEVEL RISE Final Report**

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 274 p (PB90-172628; EPA/230/05-89/052-APP-B) Avail: CASI HC A12/MF A03

Back-up research studies are presented for the Potential Effects of Global Climate Change on the United States report for Congress (1989). The following topics are discussed: the effects of sea level rise on U.S. Coastal Wetlands; a national assessment of beach nourishment requirements associated with accelerated sea level rise; the cost of defending developed shorelines along sheltered waters of the United States from a two meter rise in mean sea level; and the cost of not holding back the sea (phase 1 economic vulnerability). An overview of the nationwide impacts of sea level rise is presented. Author

N91-10397# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation. **POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX C: AGRICULTURE, VOLUME 2 Final Report**

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 236 p (PB90-171596; EPA/230/05-89/053-APP-C-VOL-2) Avail: CASI HC A11/MF A03

Back-up research studies are presented for the Potential Effects of Global Climate Change on the United States report for Congress (1989). Volume 2 of the studies includes effects of climate changes on agriculture. The studies include: direct (physiological) effects of increasing CO₂ on crop plants and their interactions with indirect (climatic) effects; potential effects of climate change on plant-pest interactions; impacts of climate change on the transport of agricultural chemicals across the USA Great Plains and Central Prairie; farm-level adjustments by Illinois corn producers to climate change; changing animal disease patterns induced by the greenhouse effect; the effect of climatic warming on populations of the horn fly with associated impact on weight gain and milk production in cattle; and the agricultural policies for climate changes induced by greenhouse gases. Author

N91-10398# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation.

POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX D: FORESTS Final Report JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 235 p

(PB90-173238; EPA/230/05-89/054-APP-D) Avail: CASI HC A11/MF A03

Back-up research studies are presented for the Potential Effects of Global Climate Change on the United States report for Congress (1989). The studies include: assessment of the response

of vegetation to future climate change through ecological response surfaces and paleoecological model validation; the effects of climate change on the forests of the Great Lakes Region, California, and the Southeastern United States; and ancient analogs for greenhouse warming of central California. Author

N91-10399# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation.

POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX E: AQUATIC RESOURCES Final Report

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 182 p (PB90-172297; EPA/230/05-89/055-APP-E) Avail: CASI HC A09/MF A02

Back-up research studies are presented for the Potential Effects of Global Climate Change on the United States report for Congress (1989). The studies include: the effects of global climate change on the water quality of mountain lakes and streams; potential responses of Great Lakes' fishes and their habitat to global climate warming; ecological effects of global climate change and the wetland resources of San Francisco Bay; and the projected changes in estuarine conditions based on models of long-term atmospheric alteration. Author

N91-10400# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation.

POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX F: AIR QUALITY Final Report

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 209 p (PB90-172230; EPA/230/05-89/056-APP-F) Avail: CASI HC A10/MF A03

Back-up research studies are presented for the Potential Effects of Global Climate Change on the United States report for Congress (1989). The studies included are climate change and its interactions with air chemistry, and sensitivity of a regional oxidant model to variations in climate parameters. Author

N91-10401# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation.

POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX G: HEALTH Final Report

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 109 p (PB90-173881; EPA/230/05-89/057-APP-G) Avail: CASI HC A06/MF A02

Health research studies are given for the Potential Effects of Global Climate Change on the United States report for Congress (1989). The studies include: the impact of CO₂ and trace gas-induced climate changes upon human mortality; computer simulation of the effects of changes in weather patterns on vector-borne disease transmission; and the potential impact of climate change on patterns of infectious disease in the United States. Author

N91-10402# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation.

POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX H: INFRASTRUCTURE Final Report

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 179 p (PB90-172313; EPA/230/05-89/058-APP-H) Avail: CASI HC A09/MF A02

Back-up research studies are presented for the Potential Effects of Global Climate Change on the United States report for Congress (1989). The studies include: the potential effects of climate change on regional and national demands for electricity; impact of global climate change on urban infrastructure; impacts of extremes in Lake Michigan levels along Illinois shoreline low levels;

and the effect of climate change on shipping within Lake Superior and Lake Erie. Author

N91-10403# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation.

POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX I: VARIABILITY Final Report

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 110 p (PB90-173899; EPA/230/05-89/059-APP-I) Avail: CASI HC A06/MF A02

Weather variability research studies are presented for the Potential Effects of Global Climate Change on the United States report for Congress (1989). The studies include: an analysis of climate variability in general circulation models, comparison with observations and changes in variability in 2 x CO₂ experiments, and the change in climate variability in the 21st century. Author

N91-10404# Environmental Protection Agency, Washington, DC. Office of Policy, Planning, and Evaluation.

POTENTIAL EFFECTS OF GLOBAL CLIMATE CHANGE ON THE UNITED STATES. APPENDIX J: POLICY Final Report

JOEL B. SMITH, ed. and DENNIS A. TIRPAK, ed. May 1989 190 p (PB90-173188; EPA/230/05-89/060-APP-J) Avail: CASI HC A09/MF A02

Back-up research studies are presented for the Potential Effects of Global Climate Change on the United States report for Congress (1989). The studies include: societal responses to regional climate change (forecasting by analogy); climate change perceptions among natural resource decision-makers in the case of water supply managers; applicability of Federal long-range planning and environmental impact statement processes to global climate change issues; climate change and water resources in the Sacramento-San Joaquin region of California (policy adjustment options); effects of global warming on the implications for policies and institutions in the Great Lakes Region; policy implications of global climate change impacts upon the Tennessee Valley Authority Reservoir System, Apalachicola River estuary and bay, and South Florida. Author

N91-15632# Oak Ridge National Lab., TN. Environmental Sciences Div.

TRENDS '90: A COMPENDIUM OF DATA ON GLOBAL CHANGE

THOMAS A. BODEN, PAUL KANCIRUK, MICHAEL FARRELL, R. J. SEPANSKI, ed., and F. W. STOSS, ed. Aug. 1990 527 p (Contract DE-AC05-84OR-21400)

(DE91-000587; ORNL/CDIAC-36) Avail: CASI HC A23/MF A04

This document is a source of frequently used global change data. This first issue includes estimates for global and national CO₂ emissions from the burning of fossil fuels and from the production of cement, historical and modern records of atmospheric CO₂ and methane concentrations, and several long-term temperature records. Included are tabular and graphical presentations of the data, discussions of trends in the data, and references to publications that provide further information. Data are presented in a two-page format, each dealing with a different data set. All data are available in digital form from the Carbon Dioxide Information Analysis Center. DOE

N91-16446# Brookhaven National Lab., Upton, NY. Dept. of Applied Science.

SOLVING GLOBAL ENVIRONMENTAL PROBLEMS THROUGH TECHNOLOGICAL INNOVATION

MEYER STEINBERG Mar. 1990 15 p Presented at the GISPRI Symposium '90 Meeting, Tokyo, Japan, 28 Feb. 1990 (Contract DE-AC02-76CH-00016) (DE90-010018; BNL-44417; CONF-9002113-1) Avail: CASI HC A03/MF A01

Much of the environment problems arise from the supply and utilization of energy for industrial, transportation and domestic

45 ENVIRONMENT POLLUTION

markets. The use of fossil fuels can result in environmental, atmospheric, and terrestrial problems, including organic, acid rain, and global warming hazards. The CO₂ global greenhouse problem is addressed along with the nuclear industry and its dilemma as well. The possibility is recognized of global natural feedback phenomena which may limit and mitigate anthropomorphic global greenhouse climate change, however, the discussion is limited to anthropomorphic (man made) technological mitigation process as opposed to adaptation which means adapting to change. DOE

N91-16451# Oak Ridge National Lab., TN. Environ. Sciences Div.
POTENTIAL RESPONSES OF LANDSCAPE BOUNDARIES TO GLOBAL ENVIRONMENTAL CHANGE

MONICA G. TURNER, ROBERT H. GARDNER, and ROBERT V. ONEILL 1990 35 p Presented at the Annual Conference of Ecological Society of America, Snowbird, NC, 29 Jul. - 2 Aug. 1990 (Contract DE-AC05-84OR-21400)

(DE90-008568; CONF-900775-1) Avail: CASI HC A03/MF A01

Global change is likely to affect the location, size, shape, or composition of landscape boundaries. Neutral models were used to study two general mechanisms by which landscape boundaries may respond to global change: (1) disturbance regimes may change in response to climate, leading to rapid alterations in landscape structure; and (2) in the absence of disturbance, suitable habitat for different species may move gradually and directionally. The spread of disturbance was simulated as a function of the proportion of the landscape occupied by a disturbance-prone habitat and the frequency and intensity of a habitat-specific disturbance. The effects of changing disturbance regimes on landscape boundaries were different in connected and fragmented landscapes. In connected landscapes, an increase in disturbance intensity caused landscape boundaries to decrease. In landscapes that were fragmented, an increase in disturbance frequency resulted in a decrease in landscape boundaries. Habitat displacement and species migration were simulated as a function of the proportion of half of a landscape occupied by a community, migration, extinction, and the rate at which potential habitat is displaced. Author

N91-17453 National Academy of Sciences - National Research Council, Washington, DC. Committee on Global Change.

GLOBAL CHANGE AND OUR COMMON FUTURE. PAPERS FROM A FORUM

RUTH S. DEFRIES, ed. and THOMAS F. MALONE, ed. (Saint Joseph's Coll., West Hartford, CT.) National Academy Press 1989 231 p Forum held in Washington, DC, 2-3 May 1989 (LC-89-62950; ISBN-0-309-04089-2) Copyright Avail: Issuing Activity

The objectives of this forum were threefold: (1) to present to the public a balanced and authoritative view of the wide range of global change issues, including the science of the earth system, the impacts of global change on society, and the implications for public policy; (2) to describe developments in the emerging interdisciplinary approach to the study of the earth system, aimed toward developing the knowledge base on which rational public policy decisions on global change can be pursued; and (3) to delineate the social, political, and economic framework within which the scientific and technological issues and the policy options need to be explored. The document is divided into the following topics (1) society's stake in global change; (2) the Earth system; (3) impacts of global change; and (4) implications for public policy.

N91-17454*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

GLOBAL CHANGE AND CARRYING CAPACITY: IMPLICATIONS FOR LIFE ON EARTH

PAUL R. EHRLICH (Stanford Univ., CA.), GRETCHEN C. DAILY (Stanford Univ., CA.), ANNE H. EHRLICH (Stanford Univ., CA.), PAMELA MATSON, and PETER VITOUSEK (Stanford Univ., CA.) In National Academy of Sciences - National Research Council, Global Change and Our Common Future. Papers from a Forum p 19-27 1989

Avail: Issuing Activity

Determining the long-term number of people that the planet can support without irreversibly reducing its ability to support people in the future, i.e., the carrying capacity of the Earth, is an exceedingly complex problem. About all that is known for certain is that, with present and foreseeable technologies, the human population has already exceeded the capacity. The reduction in carrying capacity that can be expected to result from direct human impacts on resources and the environment and from our indirect impacts of the climate system is discussed. Global warming and modeling global change and food security are also discussed with respect to carrying capacity. Author

N91-17457# National Academy of Sciences - National Research Council, Washington, DC.

THE US GLOBAL CHANGE RESEARCH PROGRAM: AN ASSESSMENT OF THE FY 1991 PLANS

1990 122 p

(Contract NSF OCE-90-14447)

(LC-90-62105; ISBN-0-309-04328-X) Avail: CASI HC A06/MF A02

This report was prepared in response to a request that the National Research Council (NRC) assess whether the FY 1991 plan for the U.S. Global Change Research Program (USGCRP) is a sound approach to reducing the scientific uncertainties regarding global change issues. The charge included several specific questions concerning the plans for the Earth Observing System (a large, single initiative of NASA) in the context of the USGCRP. The report was prepared by two coordinated panels established under the auspices of the NRC Committee on Global Change. Author

N91-18492# Oak Ridge National Lab., TN.

INFORMATION TECHNOLOGY AND GLOBAL CHANGE SCIENCE

F. PAUL BAXTER 1990 10 p Presented at the Global Change: Economic Issues in Agriculture, Forestry, and Natural Resources, Washington, DC, 19-21 Nov. 1990

(Contract DE-AC05-84OR-21400)

(DE91-005020; CONF-9011154-1) Avail: CASI HC A02/MF A01

The goal of this paper is to identify and briefly describe major existing and near term information technologies that could have a positive impact on the topics being discussed at this conference by helping to manage the data of global change science and helping global change scientists conduct their research. Desktop computer systems have changed dramatically during the past seven years. Faster data processing can be expected in the future through full development of traditional serial computer architectures. Some other proven information technologies may be currently underutilized by global change scientists. Relational database management systems and good organization of data through the use of thoughtful database design would enable the scientific community to better share and maintain quality research data. Custodians of the data should use rigorous data administration to ensure integrity and long term value of the data resource. Still other emerging information technologies that involve the use of artificial intelligence, parallel computer architectures, and new sensors for data collection will be in relatively common use in the near term and should become part of the global science community's technical toolkit. Consideration should also be given to the establishment of Information Analysis Centers to facilitate effective organization and management of interdisciplinary data and the prototype testing and use of advanced information technology to facilitate rapid and cost-effective integration of these tools into global change science. DOE

N91-19528# Committee on Commerce, Science, and Transportation (U.S. Senate).

GLOBAL CHANGE: WHAT YOU CAN DO

Washington GPO 1990 88 p Hearing before the Committee on Commerce, Science, and Transportation, 101st Congress, 2d Session, 25 Apr. 1990

(S-HRG-101-1160; GPO-38-022) Avail: Committee on Commerce, Science, and Transportation, Senate, Washington, DC 20510 HC

free; also available SOD HC \$2.75 as 552-070-09826-7

Hearings before the Senate Committee on Commerce, Science, and Transportation are presented on simple things that a person can do to reduce threats to the global environment. Specific threats addressed include greenhouse warming, ozone depletion, acid rain, and other effects of pollution and global changes in marine ecosystems, agriculture, forestry, and human health. It is noted that even small steps, such as more double-sided photocopying, can save trees; that maintaining a second home wastes resources; and that several books written by one witness describe other things one can do to save the Earth. The Federal Government is urged to set an example and to pass appropriate legislation to encourage conservation and reduce pollution. J.P.S.

N91-19533# Oak Ridge National Lab., TN.

THE DILEMMA OF FOSSIL FUEL USE AND GLOBAL CLIMATE CHANGE

R. R. JUDKINS, W. FULKERSON, and M. K. SANGHVI 1991 15 p Presented at the 201st American Chemical Society (ACS) National Meeting, Atlanta, GA, 14-19 Apr. 1991 (Contract DE-AC05-84OR-21400) (DE91-007859; CONF-910402-7) Avail: CASI HC A03/MF A01

The use of fossil fuels and relationship to climate change is discussed. As the use of fossil fuels has grown, the problems of protecting the environment and human health and safety have also grown, providing a continuing challenge to technological and managerial innovation. Today that challenge is to control atmospheric emissions from combustion, particularly those emissions that cause acidic deposition, urban pollution, and increasing concentrations of greenhouse gases. Technology for reducing acidic deposition is available and needs only to be adopted, and the remedies for urban pollution are being developed and tested. How effective or expensive these will be remains to be determined. The control of emissions of the greenhouse gas, CO₂, seems possible only by reducing the total amounts of fossil fuels used worldwide, and by substituting efficient natural gas technologies for coal. Long before physical depletion forces the transition away from fossil fuels, it is at least plausible and even likely that the greenhouse effect will impose a show-stopping constraint. If such a transition were soon to be necessary, the costs would be very high because substitute energy sources are either limited or expensive or undesirable for other reasons. Furthermore, the costs would be unevenly felt and would be more oppressive for developing nations because they would be least able to pay and, on average, their use rates of fossil fuels are growing much faster than those of many industrialized countries. It is prudent, therefore, to try to manage the use of fossil fuels as if a greenhouse constraint is an important possibility. DOE

N91-19537# Colorado Univ., Boulder, CO. Cooperative Inst. for Research in Environmental Sciences.

THERMOHALINE CIRCULATIONS AND GLOBAL CLIMATE CHANGE

H. P. HANSON 1991 6 p (Contract DE-FG02-90ER-61019) (DE91-007458; DOE/ER-61019/1) Avail: CASI HC A02/MF A01

This report is ultimately concerned with investigating the hypothesis that changes in surface thermal and hydrological forcing of the North Atlantic, changes that might be expected to accompany CO₂-induced global warming, could result in ocean-atmosphere interactions' exerting a positive feedback on the climate system. Because the North Atlantic is the source of much of the global ocean's reservoir of deep water, and because this deep water could sequester large amounts of anthropogenically produced CO₂, changes in the rate of deep-water production are important to future climates. Since deep-water production is controlled, in part, by the annual cycle of the atmospheric forcing of the North Atlantic, and since this forcing depends strongly on both hydrological and thermal processes as well as the windstress, there is the potential for feedback between the relatively short-term response of the atmosphere to changing radiative forcing and the longer-term processes in the oceans. DOE

N91-19540# Southern Methodist Univ., Dallas, TX. Dept. of Statistical Science.

STATISTICAL EXAMINATION OF CLIMATOLOGICAL DATA RELEVANT TO GLOBAL TEMPERATURE VARIATION

H. L. GRAY, R. F. GUNST, and W. A. WOODWARD Jan. 1991 14 p (Contract DE-FG05-90ER-61015) (DE91-007881; DOE/ER-61015/1) Avail: CASI HC A03/MF A01

The research group at Southern Methodist Univ. began the examination of climatological data. The initial efforts have involved an extensive amount of reading of the relevant literature in order to understand the data which are available and to assess the analyses which have been performed to date. Data from CDIAC, NCAR, the Climate Research Unit at the Univ. of East Anglia, and the Geophysical Institute of the Univ. of Alaska has been acquired and began to be analyzed. The group has had meetings on a weekly basis which have enhanced the interaction among the statisticians, anthropologists and geologists on the team. The initial efforts can be categorized as assessment of the quality of climatological data and times series analysis of data related to climatological variation. The results in these areas along with projected progress within the next six months is discussed. The major accomplishment has been the accessing of the data from the sources listed, the placing of these data on the computer in a readable form, and initiation of not only analyses of these data but also of the critical evaluations of their integrity. DOE

N91-20567# Transportation Research Board, Washington, DC. **GLOBAL WARMING: TRANSPORTATION AND ENERGY CONSIDERATIONS, 1990**

E. L. HILLSMAN, F. SOUTHWORTH, N. A. IRWIN, W. F. JOHNSON, and C. L. SARICKS 1990 78 p (PB91-118919; TRB/TRR-1267; ISBN-0-309-05017-0; LC-90-44171) Avail: CASI HC A05/MF A01

Topics addressed include: factors that may influence responses of the U.S. transportation sector to policies for reducing greenhouse gas emissions; implications of long-term climatic changes for transportation in Canada; review of technological and policy options for mitigating greenhouse gas emissions from mobile sources; initial assessment of roadway-powered electric vehicles; and funding transportation energy conservation programs with oil overcharge settlements. NTIS

N91-22619*# Colorado Univ., Boulder, CO. Center for Space and Geosciences Policy.

RESEARCH IN GEOSCIENCES POLICY Year 2 Status Report, 1 Jan. - 31 Dec. 1990

RADFORD BYERLY, JR. and SALLY MCVEY 1 Apr. 1991 138 p (Contract NAGW-1415) (NASA-CR-188038; NAS 1.26:188038) Avail: CASI HC A07/MF A02

Various topics related to cases of difficult adaptation to global change are discussed. Topics include patterns in the ratification of global environmental treaties, the effects of global climate change on Southeast Asia, and global change and biodiversity loss.

N91-22622*# Colorado Univ., Boulder, CO. Center for Values and Social Policy.

GLOBAL CHANGE AND BIODIVERSITY LOSS: SOME IMPEDIMENTS TO RESPONSE

KAREN BORZA and DALE JAMIESON In its Research in Geosciences Policy p 64-107 1 Apr. 1991 Avail: CASI HC A03/MF A02

Discussed here are the effects of anthropogenic global climate change on biodiversity. The focus is on human responses to the problem. Greenhouse warming-induced climate change may shift agricultural growing belts, reduce forests of the Northern Hemisphere and drive many species to extinction, among other effects. If these changes occur together with the mass extinctions already occurring, we may suffer a profound loss of biological diversity. Author

45 ENVIRONMENT POLLUTION

N91-22623* Colorado Univ., Boulder, CO. Center for Space and Geosciences Policy.

A REMOTE SENSING APPLICATIONS UPDATE: RESULTS OF INTERVIEWS WITH EARTH OBSERVATIONS COMMERCIALIZATION PROGRAM (EOCAP) PARTICIPANTS
SALLY MCVEY *In its* Research in Geosciences Policy p 108-136
1 Apr. 1991

Avail: CASI HC A03/MF A02

Earth remote sensing is a uniquely valuable tool for large-scale resource management, a task whose importance will likely increase world-wide through the foreseeable future. NASA research and engineering have virtually created the existing U.S. system, and will continue to push the frontiers, primarily through Earth Observing System (EOS) instruments, research, and data and information systems. It is the researchers' view that the near-term health of remote sensing applications also deserves attention; it seems important not to abandon the system or its clients. The researchers suggest that, like its Landsat predecessor, a successful Earth Observing System program is likely to reinforce pressure to 'manage' natural resources, and consequently, to create more pressure for Earth Observations Commercialization (EOCAP) type applications. The current applications programs, though small, are valuable because of their technical and commercial results, and also because they support a community whose contributions will increase along with our ability to observe the Earth from space. Author

N91-24687# Federal Coordinating Council for Science, Engineering and Technology, Washington, DC. Committee on Earth and Environmental Sciences.

OUR CHANGING PLANET: THE FY 1991 RESEARCH PLAN OF THE US GLOBAL CHANGE RESEARCH PROGRAM

Oct. 1990 266 p

(PB91-145813) Avail: CASI HC A12/MF A03

The research planning for the U.S. Global Change Research Program for fiscal year (FY) 1991 is emphasized. It is the second in a series of such documents that facilitates the coordination of the program and reflects the research and integrated budget planning processes of the Working Group on Global Change of the Committee on Earth and Environmental Sciences (CEES). These research planning and budgetary activities are extended through FY 1991. The key emphasis in FY 1991 is on establishing the research required to provide the scientific information needed as input to current environmental policy issues, e.g., stratospheric ozone depletion and climate change, including greenhouse warming. The opening sections summarize the following: (1) these policy needs in the context of global change science; (2) the planning of the research program to address them; and (3) the benefits to be accrued from the enhanced understanding. NTIS

N91-24690# Executive Office of the President, Washington, DC. Committee on Earth and Environmental Sciences.

OUR CHANGING PLANET: THE FY 1992 US GLOBAL CHANGE RESEARCH PROGRAM. A SUPPLEMENT TO THE US PRESIDENT'S FISCAL YEAR 1992 BUDGET

1991 102 p

Avail: CASI HC A06/MF A02

The central goal of the U.S. Global Change Research Program is to establish the scientific basis in support of national and international policymaking relating to natural and human-induced changes in the global Earth system by: (1) establishing an integrated, comprehensive, long-term program of documenting the Earth system on the global scale; (2) conducting program of focused studies to improve the understanding of the physical, geological, chemical, biological, and social processes that influence Earth system processes; and (3) developing integrated conceptual and predictive Earth system models. Author

N91-32587# San Diego State Univ., CA.

MODELING THE RESPONSE OF PLANTS AND ECOSYSTEMS TO GLOBAL CHANGE

J. F. REYNOLDS, P. HARLEY, D. W. HILBERT, and P. R. KEMP

1 Jun. 1991 57 p

(Contract DE-FG03-86ER-60490)

(DE91-017403; DOE/ER-60490/T1) Avail: CASI HC A04/MF A01

Complex global changes, such as elevated atmospheric CO₂, are difficult to address because they require translating information across many spatial and temporal scales. While the direct effects of a change may be focused at a single scale, ramifications of the change may be seen at higher and lower scales. Understanding these interactions and predicting them requires modeling, but a single model cannot be expected to span all scales. Our aim has been to develop a hierarchy of models, each suited to a particular scale, that receive information from lower levels and provide input to higher level models. GEPSI, our GEneric Plant Simulator, models responses at the level of leaves, canopies, resource allocation and plant/plant interactions, while SERECO adds soil and atmospheric environments. DOE

N92-10232# Resources for the Future, Inc., Washington, DC.

CLIMATE CHANGE: PROBLEMS OF LIMITS AND POLICY RESPONSES

PIERRE R. CROSSON *In its* Greenhouse Warming: Abatement and Adaptation p 69-82 1991

Avail: CASI HC A03/MF A02

Present emission rates of carbon dioxide (CO₂) and the other principle greenhouse gases (radiatively important gases (RIG's)) - methane, nitrous oxide, and chlorofluorocarbons - exceed the capacity of the oceanic, terrestrial, and tropospheric sinks to absorb them. Consequently, their concentrations in the troposphere are increasing and will continue to increase so long as emissions exceed sink capacities. It is assumed that an indefinitely persistent gap between emissions and sinks of RIG's implies indefinite global warming and related changes in regional climates. The high monetary and environmental costs that would be imposed by global warming are discussed along with the changes in energy policy that are needed to insure that these high costs will not be past on to future generations. Author

N92-10233# Resources for the Future, Inc., Washington, DC. Center for Risk Management.

ASSESSING AND MANAGING THE RISKS OF CLIMATE CHANGE

PAUL R. PORTNEY *In its* Greenhouse Warming: Abatement and Adaptation p 83-104 1991

Avail: CASI HC A03/MF A02

Some similarities and differences between the assessment and management of climate problems are presented along with ordinary environmental regulatory problems. The applicability of a familiar rule often invoked in thinking about the management of traditional environmental risks, namely, that an ounce of prevention is worth a pound of cure, is addressed with respect to the optimal management of climate-related risks. Author

N92-10234# Resources for the Future, Inc., Washington, DC.

CLIMATE AND FORESTS

ROGER A. SEDJO and ALLEN M. SOLOMON (International Inst. for Applied Systems Analysis, Laxenburg, Austria) *In its* Greenhouse Warming: Abatement and Adaptation p 105-119 1991

Avail: CASI HC A03/MF A02

The effects of forests on climate change and the effects of climate change on forests are examined. In particular, the mechanisms whereby changing CO₂ levels and global warming might affect forest growth and composition are examined. The economic cost required to establish plantation forests in temperate and tropical regions are estimated. In addition, the economic uses to which the newly established forest stock might be put are investigated. The possible effects of these higher stocking levels on world industrial wood markets and on investments in traditional industrial forestry activities are addressed, and the broad economic implications are examined. The question of the source of financing is addressed briefly and the possibility/necessity of foreign assistance is examined. Author

N92-10238# International Federation of Inst. for Advanced Study, Toronto (Ontario).

HUMAN DIMENSIONS OF GLOBAL CHANGE: TOWARD A RESEARCH AGENDA

IAN BURTON *In Resources for the Future, Inc., Greenhouse Warming: Abatement and Adaptation* p 159-174 1991

Avail: CASI HC A02/MF A02

The Earth's environment is being transformed by human activity. Human activity, in turn, is being affected by these transformations. This interaction is being studied under the aegis of global change in the geosphere-biosphere. The purpose here is to explore the basis for and the substance of a proposed research program focused on the human dimensions of global change. Global warming due to the greenhouse effect, CO₂ reduction, environment impacts, land use management, and the removal of greenhouse gases from the atmosphere are among the topics covered. Author

N92-10240# Resources for the Future, Inc., Washington, DC.

EPILOGUE

CHESTER L. COOPER *In its Greenhouse Warming: Abatement and Adaptation* p 175-182 1991

Avail: CASI HC A02/MF A02

A general discussion of the issues raised during the conference is given. Global warming due to the greenhouse effect, climate change, agricultural, and forestry are discussed. General policy considerations, the improvement of energy efficiency, fuel switching as a way of reducing the rate of CO₂ emissions, capturing of CO₂ through forest management, water management, and adapting to sea level rises are covered. Author

N92-14490# McDonnell-Douglas Space Systems Co., Sea-brook, MD.

NEED FOR EXPANDED ENVIRONMENTAL MEASUREMENT CAPABILITIES IN GEOSYNCHRONOUS EARTH ORBIT

ENRICO P. MERCANTI 1991 11 p

(Contract NAS5-30363)

(NASA-CR-183487; NAS 1.26:183487) Avail: CASI HC A03/MF A01

The proliferation of environmental satellites in low altitude earth orbit (LEO) has demonstrated the usefulness of earth remote sensing from space. As use of the technology grows, the limitations of LEO missions become more apparent. Many inadequacies can be met by remote sensing from geosynchronous earth orbits (GEO) that can provide high temporal resolution, consistent viewing of specific earth targets, long sensing dwell times with varying sun angles, stereoscopic coverage, and correlative measurements with ground and LEO observations. An environmental platform in GEO is being studied by NASA. Small research satellite missions in GEO were studied (1990) at GSFC. Some recent independent assessments of NASA Earth Science Programs recommend accelerating the earlier deployment of smaller missions. Author

N92-15457# National Aeronautics and Space Administration, Washington, DC.

REPORT OF THE INTERNATIONAL OZONE TRENDS PANEL 1988, VOLUME 2

1989 404 p Prepared in cooperation with UN Environment Programme, Nairobi, Kenya; WMO, Geneva, Switzerland; NOAA, Washington, DC; and FAA, Washington, DC

(NASA-TM-105119; NAS 1.15:105119; GORMP-18-VOL-2) Avail: CASI HC A18/MF A04

Chapters on the following topics are presented: trends in stratospheric temperature; theory and observations- model simulations of the period 1955-1985; trends in source gases; trends in stratospheric minor constituents; trends in aerosol abundances and distribution; and observations and theories related to antarctic ozone.

N92-15464# National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.

GLOBAL CHANGE TECHNOLOGY ARCHITECTURE TRADE STUDY

L. BERNARD GARRETT, ed. (Bionetics Corp., Hampton, VA.), WARREN D. HYPES, ed. (Bionetics Corp., Hampton, VA.), and ROBERT L. WRIGHT, ed. Sep. 1991 397 p (Contract RTOP 506-49-31)

(NASA-TM-104128; NAS 1.15:104128) Avail: CASI HC A17/MF A04

Described here is an architecture trade study conducted by the Langley Research Center to develop a representative mix of advanced space science instrumentation, spacecraft, and mission orbits to assist in the technology selection processes. The analyses concentrated on the highest priority classes of global change measurements which are the global climate changes. Issues addressed in the tradeoffs includes assessments of the economics of scale of large platforms with multiple instruments relative to smaller spacecraft; the influences of current and possible future launch vehicles on payload sizes, and on-orbit assembly decisions; and the respective roles of low-Earth versus geostationary Earth orbiting systems.

N92-15465# National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.

SCIENCE REQUIREMENTS FOR A GLOBAL CHANGE TECHNOLOGY INITIATIVE ARCHITECTURE TRADE STUDY

JOHN T. SUTTLES (Lockheed Engineering and Sciences Co., Hampton, VA.), EDWIN F. HARRISON, GARY G. GIBSON (Lockheed Engineering and Sciences Co., Hampton, VA.), and THOMAS G. CAMPBELL *In NASA. Langley Research Center, Global Change Technology Architecture Trade Study* p 73-89 Sep. 1991 Previously announced as N91-25558

Avail: CASI HC A03/MF A04

Science requirements for a Global Change Technology Initiative (GCTI) Architecture Trade Study were established by reviewing and synthesizing results from recent studies. A scientific rationale was adopted and used to identify a comprehensive set of measurables and their priorities. Spatial and temporal requirements for a number of measurement parameters were evaluated based on results from several working group studies. Science requirements were defined using these study results in conjunction with guidelines for investigating global changes over a time scale of decades to centuries. Requirements are given separately for global studies and regional process studies. For global studies, temporal requirements are for sampling every 1 to 12 hours for atmospheric and radiation parameters and 1 day or more for most Earth surface measurements. Therefore, the atmospheric measurables provide the most critical drivers for temporal sampling. Spatial sampling requirements vary from 1 km for land and ocean surface characteristics to 50 km for some atmospheric parameters. Thus, the land and ocean surface parameters have the more significant spatial variations and provide the most challenging spatial sampling requirements. Author

N92-15474# National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.

GLOBAL CHANGE TECHNOLOGY INITIATIVE ARCHITECTURE TRADE STUDY PLAN

In its Global Change Technology Architecture Trade Study p 341-349 Sep. 1991

Avail: CASI HC A02/MF A04

The overall objective of the trade study is to define the architectural mix of missions, spacecraft/platforms, and sensors to meet the science requirements of the Mission to Planet Earth/Global Change Technology Initiative (MPE/GCTI) beyond the early Earth Observing System (Eos) and Geosynchronous Earth Orbit (GEO) spacecraft missions. Within the overall objective, the study includes the following specific objectives: (1) Substantiate the selected mix of Low Earth Orbit (LEO), GEO, or intermediate orbit spacecraft/platforms; (2) Define the required number and size of spacecraft related to objective (1); (3) Define a generic sensor complement for the spacecraft/platforms; (4) Evaluate current spacecraft capabilities to meet the mission requirements and develop conceptual designs of spacecraft/platforms as required. (5) Identify advanced or new technology needed to most efficiently accomplish the MPE/GCTI Program. Author

45 ENVIRONMENT POLLUTION

N92-16503# Brown Univ., Providence, RI.

SENSITIVITY OF CLIMATE MODELS: COMPARISON OF SIMULATED AND OBSERVED PATTERNS FOR PAST CLIMATES

W. L. PRELL, T. WEBB, III, and R. J. OGLESBY Oct. 1991 14 p
(Contract DE-FG02-85ER-60304)

(DE92-002820; DOE/ER-60304/6) Avail: CASI HC A03/MF A01

Predicting the potential climatic effects of increased concentrations of atmospheric carbon dioxide requires the continuing development of climate models. As one index of the magnitude of past climates change, the global mean temperature increase during the past 18,000 years is similar to that predicted for carbon dioxide doubling. Simulating the climate changes of the past 18,000 years, as well as the warmer-than-present climate of 6000 years ago and the climate of the last interglacial, around 126,000 years ago, provides an excellent opportunity to test the models that are being used in global climate change research. During the past several years, we have used paleoclimatic data to test the accuracy of the NCAR CCMO (National Center for Atmospheric Research, Community Climate Model, Version 0), after changing its boundary conditions to those appropriate for past climates. We have assembled near-global paleoclimatic data sets of pollen, lake level, and marine plankton data and calibrated many of the data in terms of climatic variables. We have also developed methods that permit direct quantitative comparisons between the data and model results. Our comparisons have shown both some of the strengths and weaknesses of the model. The research so far has shown the feasibility of our methods for comparing paleoclimatic data and model results. Our research has also shown that comparing the model results with the data is an evolutionary process, because the models, the data, and the methods for comparison are continually being improved. During 1991, we have continued our studies and this Progress Report documents the results to date. During this year, we have completed new modeling experiments, compiled new data sets, made new comparisons between data and model results, and participated in workshops on paleoclimatic modeling. DOE

N92-20647# General Accounting Office, Washington, DC. **GREENHOUSE EFFECT: DOE'S PROGRAMS AND ACTIVITIES RELEVANT TO THE GLOBAL WARMING PHENOMENON**

Mar. 1990 51 p

(GAO/RCED-90-74BR; B-237780) PO Box 6015, Gaithersburg, MD 20877 HC first five copies free, additional copies \$2.00

Background information is given on the global warming issue as well as the Department of Energy's (DOE's) objectives, scope, and methodology in relation to the problem. Details are given on DOE's policies and research efforts. Examples of energy policy and program changes to mitigate the global warming phenomenon that have been suggested by various Federal and non-Federal authorities are provided. Appendices include descriptions of DOE program areas relevant to the global climate change issue, additional information on suggested energy policy and program changes to address global warming, and a list of major contributors to this briefing report. Information is given in tabular form on DOE's FY 1989 budget and 1990 budget request for direct and indirect programs relevant to global climate change. Author

N92-21439# National Geophysical Data Center, Boulder, CO. **GLOBAL ECOSYSTEMS DATABASE. VERSION 0.1 (BETA-TEST). EPA GLOBAL CLIMATE RESEARCH PROGRAM. NOAA/NGDC GLOBAL CHANGE DATABASE PROGRAM. PROTOTYPE 1: DATABASE DOCUMENTATION. NGDC KEY TO GEOPHYSICAL RECORDS DOCUMENTATION NO. 25. USER'S MANUAL**

W. G. CAMPBELL and J. J. KINEMAN Nov. 1991 368 p
Prepared in cooperation with ManTech Environmental Technology, Inc., Corvallis, OR

(PB92-122803; EPA/600/8-91/216) Avail: CASI HC A16/MF A03

The primary objective of the cooperative research and development is to produce an integrated, quality controlled, global database (including time sequences) for spatially distributed modeling. The

project concentrates on modern observational data, including remotely sensed data and data from other sources. The database includes complementary multi-thematic data sets on comparable grids, registered to a common origin and projection (latitude-longitude). The database has been structured to be operable with several existing geographic information systems (GIS), so that a complete analytical package could be provided to reviewers and other scientists for evaluation, experimentation, and further development. The software accompanying the CD-ROM (a subset of GIS known as Idrisi) was developed and adopted for the project at Clark University. Although compatible with Idrisi, the database is also designed to be easily up-loaded to the GIS known as GRASS, running on UNIX operating systems. Since the database structure is as system independent as possible, it should also be easily usable in other systems. Author

N92-24671# Laser Applications Research Center, The Woodlands, TX.

THE 1991 WOODLANDS CONFERENCE: THE REGIONS AND GLOBAL WARMING: IMPACTS AND RESPONSE STRATEGIES

1991 24 p Conference held in Woodlands, TX, 3-6 Mar. 1991
(Contract DE-AC05-84OR-21400)

(DE92-003221; CONF-9103221-SUMM) Avail: CASI HC A03/MF A01

To date, much of the attention given to global warming in scientific research as well as in policy development has focused on the global picture. International negotiations and agreements to stabilize, and eventually reduce, greenhouse gas emissions are very important. By themselves, however, they are not sufficient to address global warming. Regional strategies are also needed. They can help reduce greenhouse gas emissions, and they will be the most effective way to mitigate the consequences of global warming. Adaptive strategies must respond to local and regional conditions. In many countries, subnational jurisdictions such as states and provinces or community organizations can already take effective actions without direction from their national government or waiting for international agreements. An important factor in defining regional approaches is the disparate consequences of climate change for developed and developing areas. Different strategies will also be needed for industrial and agricultural regions. Wealthy industrial regions may be better able to develop capital-intensive, adaptive infrastructure than regions with fewer discretionary resources where people are more vulnerable to the vagaries of weather patterns. On the other hand, regions that rely on indigenous knowledge and local resources may be better equipped to make incremental adaptations and more willing to modify life-styles. Ultimately, all climate change effects are experienced in specific places and effective response depends upon local action. We recognize that individual localities cannot solve a problem of global proportions by acting alone. However, a regional strategy can supplement international and national action and be the focal point for addressing risks in the unique social and economic context of a particular area. These meetings discussions dealt with the impacts and implications of climate change on such things as agriculture, forestry, and policy. DOE

N92-25313# Department of Energy, Washington, DC. Office of Environmental Analysis.

LIMITING NET GREENHOUSE GAS EMISSIONS IN THE UNITED STATES

R. A. BRADLEY, ed., E. C. WATTS, ed., and E. R. WILLIAMS, ed.
Sep. 1991 529 p

(DE92-007267; DOE/PE-0101) Avail: NTIS HC/MF A23

Over the past decade, global climate change has been a subject of growing concern. The United States government in general, and the US Department of Energy in particular, have increased their level of activity in this area in recent years; since the 1970's, the DOE has sponsored scientific research programs in global climate change. These programs have sought to define the issues, reduce uncertainties, and quantify the interaction of global human and natural systems. Understanding the relationship be-

tween the production and use of energy and the accumulation of radiatively active gases in the atmosphere, as well as the consequences of this relationship for global climate systems, has been of particular interest, because constructive policy cannot be formulated without a firm scientific grasp of these issues. The National Energy Strategy was developed to address all of the nation's energy concerns, taking into account related environmental issues such as global climate change. Actions included in the National Energy Strategy are projected to hold US energy-related emissions of greenhouse important gases, weighted by IPCC-estimated global warming potential (GWP) coefficients, at or below 1990 levels through the year 2030. DOE

N92-25415# General Accounting Office, Washington, DC.
GLOBAL WARMING. EMISSION REDUCTIONS POSSIBLE AS
SCIENTIFIC UNCERTAINTIES ARE RESOLVED

Sep. 1990 74 p
 (GAO/RCED-90-58; B-240222) PO Box 6015, Gaithersburg, MD 20877 HC first five copies free, additional copies \$2.00

It was concluded that industrial and agricultural activities are causing the atmospheric concentrations of greenhouse gases to exceed historic levels. Without action now, these concentrations are likely to grow, although the rate of increase is uncertain. From their review of computer modeling results, most climate scientists agree that the climate's response to this growth will be an increased average temperature over the next 100 years. They do not concur, however, on the timing and magnitude of this change or on the associated regional climate changes. While research should reduce these scientific uncertainties, quick fixes or easy answers are unlikely to emerge. Rather, research results are expected to continue pointing to the need for a comprehensive, multinational, multidecade response strategy. In the meantime, many agree that certain actions can be justified because they have benefits in addition to reducing greenhouse gases. Reducing CFC's is an example of one such activity already under way, and more can be done in other areas, such as improving energy efficiency. Author

N92-26509# ManTech Environmental Technology, Inc., Corvallis, OR.

EQUILIBRIUM-ANALYSIS OF PROJECTED CLIMATE CHANGE
EFFECTS ON THE GLOBAL SOIL ORGANIC MATTER POOL

D. P. TURNER and R. LEEMANS 1992 14 p Presented at the Carbon Cycling in Boreal Forest and Subarctic Ecosystems Workshop, Corvallis, OR, 9-12 Sep. 1991 Submitted for publication (Contract EPA-68-C8-0006)

(PB92-153022; EPA/600/A-92/039) Avail: CASI HC A03/MF A01

Increased rates of soil organic matter decomposition may represent a significant positive feedback to global warming. As a step towards assessing the potential magnitude of this response, an equilibrium analysis was performed in which representative carbon pools were associated with each vegetation type and the Holdridge vegetation/climate correlation system was used to compare distributions of the vegetation types under the current climate and doubled-CO₂ climate scenarios from four general circulation models (GCMs). Two of the GCMs predicted a net loss of below ground carbon (55-101 Pg) because of large decreases in the areal extent of tundra and boreal ecosystems with high levels of below ground carbon storage. Vegetation redistribution projected under the other two GCMs would result in the accumulation of carbon (5-41 Pg) in the biosphere. However, this accumulation was driven primarily by an increase in the areal extent of tropical rain forests, which is unlikely given the constraints imposed by anthropogenic factors. Other considerations not treated by the equilibrium approach also support the likelihood of a transient pulse of carbon from the soil to the atmosphere. Author

N92-27417# Lawrence Livermore National Lab., Livermore, CA.
SENSITIVITY OF GLOBAL WARMING POTENTIALS TO THE
ASSUMED BACKGROUND ATMOSPHERE

D. J. WUEBBLES and K. O. PATTEN Mar. 1992 9 p
 (Contract W-7405-ENG-48)

(DE92-011072; UCRL-ID-109847) Avail: CASI HC A02/MF A01

This is the first in a series of papers in which we will examine various aspects of the Global Warming Potential (GWP) concept and the sensitivity and uncertainties associated with the GWP values derived for the 1992 updated scientific assessment report of the Intergovernmental Panel on Climate Change (IPCC). One of the authors of this report helped formulate the GWP concept for the first IPCC report in 1990. The Global Warming Potential concept was developed for that report as an attempt to fulfill the request from policymakers for a way of relating the potential effects on climate from various greenhouse gases, in much the same way as the Ozone Depletion Potential (ODP) concept is used in policy analyses related to concerns about the relative effects of CFCs and other compounds on stratospheric ozone destruction. We are also coauthors of the section on radiative forcing and Global Warming Potentials for the 1992 IPCC update; however, there was too little time to prepare much in the way of new research material for that report. Nonetheless, we have recognized for some time that there are a number of uncertainties and limitations associated with the definition of GWPs used in both the original and new IPCC reports. In this paper, we examine one of those uncertainties, namely, the effect of the assumed background atmospheric concentrations on the derived GWPs. Later papers will examine the sensitivity of GWPs to other uncertainties and limitations in the current concept. DOE

N92-29235*# Massachusetts Inst. of Tech., Cambridge. Center for Global Change Science.

THE ROLE OF LIDARS IN GLOBAL CHANGE RESEARCH

RONALD G. PRINN In NASA. Langley Research Center, Sixteenth International Laser Radar Conference, Part 1 p 21-22 Jul. 1992
 Avail: CASI HC A01/MF A04

Recent research has solidified a view of the Earth as a global scale interactive system with complex chemical, physical, biological, and dynamical processes that link the ocean, atmosphere, land, and marine terrestrial living organisms. An important aspect of Earth System Science studies in the future is the need to observe simultaneously the physical, chemical, biological, and dynamical processes involved in highly coupled phenomena such as those mentioned. Lidars operating from the surface, aircraft, and satellites provide a powerful observational technique to study the processes and observe trends important to global change. Lidar observations have already played important roles in helping understand processes controlling stratospheric ozone and aerosols, tropospheric clouds, water vapor, ozone, gaseous pollutants, and aerosols, and winds and temperatures throughout the atmosphere. In this paper the author reviews the science of global change and highlights the potential roles for lidar in studying the Earth system. H.A.

N92-31258*# National Aeronautics and Space Administration, Washington, DC.

THE DETECTION OF CLIMATE CHANGE DUE TO THE
ENHANCED GREENHOUSE EFFECT

ROBERT A. SCHIFFER and SUSHEL UNNINAYAR 1991 60 p
 Presented at the GEDEX Atmospheric Temperature Workshop, Columbia, MD, 9-11 Jul. 1991

(NASA-TM-107965; NAS 1.15:107965) Avail: CASI HC A04/MF A01

The greenhouse effect is accepted as an undisputed fact from both theoretical and observational considerations. In Earth's atmosphere, the primary greenhouse gas is water vapor. The specific concern today is that increasing concentrations of anthropogenically introduced greenhouse gases will, sooner or later, irreversibly alter the climate of Earth. Detecting climate change has been complicated by uncertainties in historical observations and measurements. Thus, the primary concern for the GEDEX project is how can climate change and enhanced greenhouse effects be unambiguously detected and quantified. Specifically examined are the areas of: Earth surface temperature; the free atmosphere (850 millibars and above); space-based measurements; measurement uncertainties; and modeling the observed temperature record. H.A.

45 ENVIRONMENT POLLUTION

N92-31259*# National Science Foundation, Washington, DC. Committee on Earth and Environmental Sciences.

OUR CHANGING PLANET: THE FY 1993 US GLOBAL CHANGE RESEARCH PROGRAM. A SUPPLEMENT TO THE US PRESIDENT'S FISCAL YEAR 1993 BUDGET

1992 89 p Revised Sponsored in part by NASA, Washington; NOAA; DOE; and EPA Original contains color illustrations (NASA-CR-190675; NAS 1.26:190675) Avail: CASI HC A05/MF A01; 2 functional color pages

An improved predictive understanding of the integrated Earth system, including human interactions, will provide direct benefits by anticipating and planning for possible impacts on commerce, agriculture, energy, resource utilization, human safety, and environmental quality. The central goal of the U.S. Global Change Research Program (USGCRP) is to help establish the scientific understanding and the basis for national and international policymaking related to natural and human-induced changes in the global Earth system. This will be accomplished through: (1) establishing an integrated, comprehensive, long-term program of documenting the Earth system on a global scale; (2) conducting a program of focused studies to improve our understanding of the physical, geological, chemical, biological, and social processes that influence the Earth system processes; and (3) developing integrated conceptual and predictive Earth system models. H.A.

N92-31620# Federal Coordinating Council for Science, Engineering and Technology, Washington, DC. Committee on Earth and Environmental Sciences.

OUR CHANGING PLANET: THE FY 1993 US GLOBAL CHANGE RESEARCH PROGRAM. A REPORT BY THE COMMITTEE ON EARTH AND ENVIRONMENTAL SCIENCES, A SUPPLEMENT TO THE US PRESIDENT'S FISCAL YEAR 1993 BUDGET

Jan. 1992 90 p

(PB92-156892) Avail: CASI HC A05/MF A01

The U.S. Global Change Research Program (USGCRP) was established as a Presidential initiative in the FY-1990 Budget to help develop sound national and international policies related to global environmental issues, particularly global climate change. The USGCRP is implemented through a priority-driven scientific research agenda that is designed to be integrated, comprehensive, and multidisciplinary. It is designed explicitly to address scientific uncertainties in such areas as climate change, ozone depletion, changes in terrestrial and marine productivity, global water and energy cycles, sea level changes, the impact of global changes on human health and activities, and the impact of anthropogenic activities on the Earth system. The USGCRP addresses three parallel but interconnected streams of activity: documenting global change (observations); enhancing understanding of key processes (process research); and predicting global and regional environmental change (integrated modeling and prediction). Author

N92-31896# Oak Ridge National Lab., TN.

ITERATIVE FUNCTIONALISM AND CLIMATE MANAGEMENT REGIMES: FROM INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE TO INTERGOVERNMENTAL NEGOTIATING COMMITTEE

D. L. FELDMAN (Tennessee Univ., Knoxville.) 1992 27 p Presented at the 4th North American Symposium on Society and Resource Management, Madison, WI, 17-20 May 1992 (Contract DE-AC05-84OR-21400)

(DE92-014798; CONF-9205167-1) Avail: CASI HC A03/MF A01

This paper contends that an iterative functionalist regime — comprised of international organizations that monitor the global climate and perform scientific and policy research on prevention, mitigation, and adaptation strategies for response to possible global warming — has developed over the past decade. A common global effort by scientists, diplomats, and others to negotiate a framework convention that would reduce emissions of carbon dioxide and other greenhouse gases has been brought about by this regime. Individuals that participate in this regime are engaged in several cooperative activities including: (1) international research on the causes and

consequences of global change; (2) global environmental monitoring and standard-setting for analyses of climate data; and (3) negotiating a framework convention that places limits on greenhouse gas emissions by countries. The implications of this iterative approach for successful implementation of a treaty to forestall global climate change are discussed. DOE

N92-31907# Oak Ridge National Lab., TN. Carbon Dioxide Information Analysis Center.

TRENDS 1991: A COMPENDIUM OF DATA ON GLOBAL CHANGE

T. A. BODEN, ed., R. J. SEPANSKI, ed., and F. W. STOSS, ed. Dec. 1991 694 p

(Contract DE-AC05-84OR-21400)

(DE92-011733; ORNL/CDIAC-46; ESD-3746) Avail: CASI HC A99/MF A06

This document is a source of frequently used global change data. This second issue of the Trends series expands the coverage of sites recording atmospheric concentrations of carbon dioxide (CO₂) and methane, (CH₄), and it updates records reported in the first issue. New data for other trace atmospheric gases have been included in this issue; historical data on nitrous oxide (N₂O) from ice cores, modern records of atmospheric concentrations of chlorofluorocarbons (CFC-11 and CFC-12) and N₂O and estimates of global estimates of CFC-11 and CFC-12. The estimates for global and national CO₂ emissions from the burning of fossil fuels, the production of cement, and gas flaring have been revised and updated. Regional CO₂ emission estimates have been added, and long-term temperature records have been updated and expanded. Data records are presented in four- to six-page formats, each dealing with a specific site, region, or emissions species. The data records include tables and graphs; discussion of methods for collecting, measuring, and reporting the data; trends in the data; and references to literature that provides further information. All data appearing in the document are available on digital media from the Carbon Dioxide Information Analysis Center. DOE

N92-32014 Alabama Univ., Huntsville, AL. Atmospheric Science Program.

THE UNCERTAINTIES OF GLOBAL TEMPERATURES IN THE GLOBAL WARMING CONTEXT

JOHN R. CHRISTY In Huntsville Association of Technical Societies, TABES 92: 8th Annual Technical and Business Exhibition and Symposium. Executive Summaries and Submitted Papers 7 p 1992 (TABES PAPER 92-447) Copyright Avail: Issuing Activity

Long-term surface temperature records have large enough uncertainties and contain enough uncertainties and contain enough natural variability that conclusions about global warming due to greenhouse gas emissions are not possible based on these data. Comparison with newly developed data from satellites indicates the surface temperatures measured today do not provide the accuracy necessary for assessing climate trends for over half of the globe. Though warm and cool years generally coincide between satellite and surface measurements, the subtle differences are sufficient to cause one to rethink the conclusions of excessive warmth of the past two years (1990-91) and decade. Author

N92-33578# Alaska Univ., Fairbanks, AK. Geophysical Inst.

PROCEEDINGS OF INTERNATIONAL CONFERENCE ON THE ROLE OF THE POLAR REGIONS IN GLOBAL CHANGE, VOLUME 1 Final Report, 1 May 1990 - 30 Apr. 1991

GUNTER WELLER Mar. 1992 361 p Proceedings held in Fairbanks, AK, 11-15 Jun. 1990

(Contract DAAL03-90-G-0126)

(AD-A253027; ARO-27859.1-GS-CF-VOL-1) Avail: CASI HC A16/MF A03

The goal of the conference was to define and summarize the state of knowledge on the role of the polar regions in global change, and to identify gaps in knowledge. To this purpose experts in a wide variety of relevant disciplines were invited to present papers and hold panel discussions. While there are numerous conferences on

global change, this conference dealt specifically with the polar regions which occupy key positions in the global system. Over 400 scientists from 15 different countries attended and presented 200 papers on research in the Arctic and Antarctic. The papers were distributed among seven major themes and sessions, each having about three invited papers, a dozen contributed papers, and 15-20 poster papers. These papers, or their abstracts, are contained in the two proceedings volumes. In publishing the papers we did not distinguish between invited, contributed, or poster papers, but gave them all equal weight. On the final day of the conference three panels met to discuss problems and priorities in polar research. A summary of their recommendations follows the final section of papers.

DTIC

N92-33579# Alaska Univ., Fairbanks, AK. Geophysical Inst. **PROCEEDINGS OF INTERNATIONAL CONFERENCE ON THE ROLE OF THE POLAR REGIONS IN GLOBAL CHANGE, VOLUME 2 Final Report, 1 May 1990 - 30 Apr. 1991** GUNTER WELLER Mar. 1992 492 p Proceedings held in Fairbanks, AK, 11-15 Jun. 1990 (Contract DAAL03-90-G-0126) (AD-A253028; ARO-27859.2-GS-CF-VOL-2) Avail: CASI HC A21/MF A04

The International Conference on the Role of the Polar Regions in Global Change took place on the campus of the University of Alaska Fairbanks on June 11-15, 1990. It was cosponsored by several national and international scientific organizations, as listed on the preceding page. The host institutions were the Geophysical Institute and the Center for Global Change and Arctic System Research, both at the University of Alaska Fairbanks. The goal of the conference was to define and summarize the state of knowledge on the role of the polar regions in global change, and to identify gaps in knowledge. To this purpose experts in a wide variety of relevant disciplines were invited to present papers and hold panel discussions. While there are numerous conferences on global change, this conference dealt specifically with the polar regions which occupy key positions in the global system. Conference,—Global Change, Polar Regions, Global System Over 400 scientists from 15 different countries attended and presented 200 papers on research in the Arctic and Antarctic. The papers were distributed among seven major themes and sessions, each having about three invited papers, a dozen contributed papers, and 15-20 poster papers. These papers, or their abstracts, are contained in the two proceedings volumes. In publishing the papers we did not distinguish between invited, contributed, or poster papers, but gave them all equal weight. On the final day of the conference three panels met to discuss problems and priorities in polar research. A summary of their recommendations follows the final section of papers. DTIC

N92-34028*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD. **GLOBAL CHANGE DATA SETS: EXCERPTS FROM THE MASTER DIRECTORY, VERSION 2.0** JOY BEIER Feb. 1992 220 p (NASA-TM-107994; NAS 1.15:107994; NSSDC/WDC-A-R/S-91-34) Avail: CASI HC A10/MF A03

The recent awakening to the reality of human-induced changes to the environment has resulted in an organized effort to promote global change research. The goal of this research as outlined by NASA's Earth System Science Committee (Earth System Science: A closer View, 1988) is to understand the entire Earth system on a global scale by describing how its component parts and their interactions have evolved, how they function, and how they may be expected to evolve on all timescales. The practical result is the capacity to predict that evolution over the next decade to century. Key variables important for the study of global change include external forcing factors (solar radiance, UV flux), radiatively and chemically important trace species (CO₂, CH₄, N₂O, etc.), atmospheric response variables (temperature, pressure, winds), landsurface properties (river run-off, snow cover, albedo, soil moisture, vegetation cover), and oceanic variables (sea surface tem-

perature, sea ice extent, sea level ocean wind stress, currents, chlorophyll, biogeochemical fluxes). The purpose of this document is to identify existing data sets available (both remotely sensed and in situ data) covering some of these variables. This is not intended to be a complete list of global change data, but merely a highlight of what is available. The information was extracted from the Master Directory (MD), an on-line scientific data information service which may be used by any researcher. This report contains the coverage dates for the data sets, sources (satellites, instruments) of the data and where they are archived. Author

N93-11094*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

RADIATIVE FORCING OF CLIMATE

V. RAMANSWAMY (Princeton Univ., N.J.), KEITH SHINE (Reading Univ., England), CONWAY LEOVY (Washington Univ., Seattle.), WEI-CHYUNG WANG (State Univ. of New York, Albany.), HENNING RODHE (Stockholm Univ., Sweden), DONALD J. WUEBBLES (Lawrence Livermore National Lab., CA.), M. DING (Stockholm Univ., Sweden), JOSEPH LELIEVELD (Max-Planck-Inst. fuer Chemie, Mainz, Germany), JAE A. EDMONDS (Department of Energy, Washington, DC.), M. PATRICK MCCORMICK et al. In NASA, Washington, Scientific Assessment of Ozone Depletion: 1991 30 p 1991

Avail: CASI MF A03; print copy available at WMO, Geneva, Switzerland; 1 functional color page

An update of the scientific discussions presented in Chapter 2 of the Intergovernmental Panel on Climate Change (IPCC) report is presented. The update discusses the atmospheric radiative and chemical species of significance for climate change. There are two major objectives of the present update. The first is an extension of the discussion on the Global Warming Potentials (GWP's), including a reevaluation in view of the updates in the lifetimes of the radiatively active species. The second important objective is to underscore major developments in the radiative forcing of climate due to the observed stratospheric ozone losses occurring between 1979 and 1990. Author

N93-11232# Alaska Univ., Fairbanks, AK. **INTERNATIONAL CONFERENCE ON THE ROLE OF THE POLAR REGIONS IN GLOBAL CHANGE: PROCEEDINGS, VOLUME 1**

G. WELLER, ed., C. L. WILSON, ed., and B. A. B. SEVERIN, ed. Dec. 1991 362 p Conference held in Fairbanks, AK, 11-15 Jun. 1990

(Contract DE-FG06-90ER-60949)

(DE92-013652; CONF-9006128-VOL-1) Avail: CASI HC A16/MF A03

The International Conference on the Role of the Polar Regions in Global Change took place on the campus of the University of Alaska Fairbanks on 11-15 Jun. 1990. The goal of the conference was to define and summarize the state of knowledge on the role of the polar regions in global change, and to identify gaps in knowledge. To this purpose experts in a wide variety of relevant disciplines were invited to present papers and hold panel discussions. While there are numerous conferences on global change, this conference dealt specifically with polar regions which occupy key positions in the global system. These two volumes of conference proceedings include papers on the following topics: (1) detection and monitoring of change; (2) climate variability and climate forcing; (3) ocean, sea ice, and atmosphere interactions and processes; (4) effects on biota and biological feedbacks; (5) ice sheet, glacier and permafrost responses and feedbacks; (6) paleoenvironmental studies; and, (7) aerosols and trace gases. DOE

N93-11233# Alaska Univ., Fairbanks, AK. **INTERNATIONAL CONFERENCE ON THE ROLE OF THE POLAR REGIONS IN GLOBAL CHANGE: PROCEEDINGS, VOLUME 2**

G. WELLER, ed., C. L. WILSON, ed., and B. A. B. SEVERIN, ed. Dec. 1991 404 p Conference held in Fairbanks, AK,

45 ENVIRONMENT POLLUTION

11-15 Jun. 1990

(Contract DE-FG06-90ER-60949)

(DE92-013653; CONF-9006128-VOL-2) Avail: CASI HC A18/MF A04

The International Conference on the Role of the Polar Regions in Global Change took place on the campus of the University of Alaska Fairbanks on 11-15 Jun. 1990. The goal of the conference was to define and summarize the state of knowledge on the role of the polar regions in global change, and to identify gaps in knowledge. To this purpose experts in a wide variety of relevant disciplines were invited to present papers and hold panel discussions. While there are numerous conferences on global change, this conference dealt specifically with the polar regions which occupy key positions in the global system. These two volumes of conference proceedings include papers on the following topics: (1) detection and monitoring of change; (2) climate variability and climate forcing; (3) ocean, sea ice, and atmosphere interactions and processes; and (4) effects on biota and biological feedbacks; (5) ice sheet, glacier and permafrost responses and feedbacks, (6) paleoenvironmental studies; and, (7) aerosol and trace gases. DOE

N93-11466# Army Engineer Topographic Labs., Fort Belvoir, VA. **GLOBAL CLIMATE CHANGE (GCC) ISSUES AND THEIR IMPACTS ON THE US ARMY CORPS OF ENGINEERS** JACK E. HUNTLEY and JOHN E. NEANDER Nov. 1991 136 p (AD-A247279; TEC-SR-1) Avail: CASI HC A07/MF A02

This report is a survey of recent findings and arguments within the scientific arena on the subject of global climate change. The focus of this report looks at global, continental, and regional issues, as well as surface and upper atmospheric effects. Potential responses by the biosphere as well as the impacts on Army operations by global climate change are examined. The geologic past provides a detailed record of Earth's climate system. It also reveals changes that took place in the concentration of atmospheric gases as Earth's climate switched from glacial to interglacial periods. The secular record of temperature shows that Earth's climate has warmed from 0.5 C to 0.7 C this past century. The world's populace is injecting tremendous amounts of greenhouse gases into the atmosphere at a rate where the effective doubling of pre-industrial carbon dioxide (CO₂) concentration could occur between the years 2035 to 2050. Clouds have been found to have a net cooling effect on the global average temperature. Anthropogenic pollutants and gases produced from biological sources may increase the amount of clouds around the world, thus adding to the cooling effect. Aftereffects of volcanic eruption, and gases emitted by phytoplankton that lead to cloud formation retard global warming. Weapon and support systems may require upgraded data bases to match vegetation changes due to evolving climate patterns. DTIC

N93-12474# Alliance to Save Energy, Washington, DC. **THE USES AND LIMITS OF ECONOMIC MODELS AS A CLIMATE CHANGE POLICY TOOL** Summary Report M. B. ZIMMERMAN and W. A. NITZE 1991 7 p Presented at the Workshop on the Uses and Limits of Economic Models as a Climate Change Policy Tool, Washington, DC, 1-2 Feb. 1991 (Contract DE-FG01-91PE-10015) (DE92-015792; CONF-9102177-SUMM) Avail: CASI HC A02/MF A01

The Alliance to Save Energy initiated this workshop as a means of bringing climate change policy makers and economists together on the eve of the opening negotiating session for a climate change convention. The one and one-half day workshop was attended by 16 analysts who provided presentations on modeling approaches. There is a need for policy makers to be better able to evaluate the growing literature estimating the potential cost of policy options. Our hope is that this report, to be presented at the conclusion of the negotiations on the framework convention on climate change at the Earth Summit in Brazil, will help policy makers in the US and elsewhere evaluate the costs and benefits of national climate change mitigation policies. Although it is still unclear how far the convention will go in requiring emissions reductions, many countries

are proceeding with detailed plans to reduce domestic carbon dioxide (CO₂) emissions. Our goal in holding the workshop and writing this report is to spark a new level of dialogue between the producers and users of information on the costs and benefits of climate mitigation policies leading to the development of more cost-effective policy solutions at the national and international levels. DOE

N93-12927# Lawrence Livermore National Lab., Livermore, CA. **A COMPUTER SIMULATION OF ECOSYSTEM PROCESSES IN FORESTS FOR APPLICATION TO AIR POLLUTION, ACID PRECIPITATION, AND GLOBAL CHANGE**

J. R. KERCHER and P. D. ANDERSON (California Univ., Berkeley.) 17 Jul. 1992 9 p Presented at the 1992 Summer Computer Simulation Conference, Reno, NV, 27-30 Jul. 1992 (Contract W-7405-ENG-48)

(DE92-019616; UCRL-JC-108957; CONF-920771-5) Avail: CASI HC A02/MF A01

We have developed a simulation model, TREE, of the effects of gaseous air pollutants and acid precipitation on the forest ecosystem processes of tree productivity and growth. This model is based on an existing general model of forest ecosystem processes developed for regional application (FOREST-BGC) combined with an existing model of plant productivity and transpiration (BACROS). The former model uses daily and annual time-steps; BACROS uses hourly time-steps and computes gaseous pollutant (ozone) uptake. In FOREST-BGC, we model the effects of ozone by reducing productivity based on the cumulative uptake for each leaf age-class. The model computations convert this reduction in productivity to a reduction in growth. This version of the model restricts consideration of acid precipitation to possible effects on productivity due to foliar exposure. Basic model performance has been studied for ponderosa pine exposed to ozone at the USFS Chico Tree Improvement Center. The model simulates observed phenomena such as draw down of soil water during summer months. For ozone levels for the Chico Field Site for the 1990 season, maximum daily ozone uptake occurred in August with peak of $2.2 \times 10^{(-5)} \text{ kg m}^{(-2)} \text{ d}^{(\text{sup } 1)}$. Cumulative annual ozone uptake for current year needles was $3.2 \times 10^{(-2)} \text{ kg m}^{(-2)}$ producing a 12.6 percent reduction in productivity for current year needles and a 13.3 percent reduction in chlorophyll and effective leaf area. Total transpiration was 0.95 m. The model is now being used to develop a terrestrial ecosystem submodel for a global scale Earth System Model (ESM) that integrates interacting atmospheric, oceanic, and land system components. Algorithms from the forest model will support feedback calculation of the effect of forests on atmospheric physics and chemistry as well as calculate effects of climate- and CO₂-change on forest productivity. DOE

N93-16092# California Univ., Berkeley. Lawrence Berkeley Lab, CA.

CARBON EMISSIONS AND SEQUESTRATION IN FORESTS: CASE STUDIES FROM SEVEN DEVELOPING COUNTRIES. VOLUME 2: GREENHOUSE GAS EMISSIONS FROM DEFORESTATION IN THE BRAZILIAN AMAZON

WILLY MAKUNDI, ed., JAYANT SATHAYE, ed., and PHILIP M. FEARNside Aug. 1992 73 p Prepared in cooperation with EPA, Washington, DC

(Contract DE-AC03-76SF-00098)

(DE93-001526; LBL-32758-VOL-2) Avail: CASI HC A04/MF A01

Deforestation in Brazilian Amazonia in 1990 was releasing approximately $281\text{-}282 \times 10^{(6)}$ metric tons (MT) of carbon on conversion to a landscape of agriculture, productive pasture, degraded pasture, secondary forest, and regenerated forest in the proportions corresponding to the equilibrium condition implied by current land-use patterns. Emissions are expressed as 'committed carbon', or the carbon released over a period of years as the carbon stock in each hectare deforested approaches a new equilibrium in the landscape that replaces the original forest. To the extent that deforestation rates have remained constant, current releases from the areas deforested in previous years will be equal to the future

releases from the areas being cleared now. Considering the quantities of carbon dioxide, carbon monoxide, methane, nitrous oxide, NO(x), and non-methane hydrocarbons released raises the impact by 22-37 percent. The relative impact on the greenhouse effect of each gas is based on the Intergovernmental Panel on Climate Change (IPCC) calculations over a 20-year time period (including indirect effects). The six gases considered have a combined global warming impact equivalent to 343 to 386 million MT of CO₂-equivalent carbon, depending on assumptions regarding the release of methane and other gases from the various sources such as burning and termites. These emissions represent 7-8 times the 50 million MT annual carbon release from Brazil's use of fossil fuels, but bring little benefit to the country. Stopping deforestation in Brazil would prevent as much greenhouse emission as tripling the fuel efficiency of all the automobiles in the world. The relatively cheap measures needed to contain deforestation, together with the many complementary benefits of doing so, make this the first priority for funds intended to slow global warming. DOE

N93-16298# Lawrence Livermore National Lab., Livermore, CA. SENSITIVITY OF DIRECT GLOBAL WARMING POTENTIALS TO KEY UNCERTAINTIES

D. J. WUEBBLES, K. O. PATTEN, K. E. GRANT, and A. K. JAIN Jul. 1992 48 p

(Contract W-7405-ENG-48)

(DE92-041045; UCRL-ID-111461) Avail: CASI HC A03/MF A01

A series of sensitivity studies examines the effect of several uncertainties in Global Warming Potentials (GWP's). For example, the original evaluation of GWP's for the Intergovernmental Panel on Climate Change (EPCC, 1990) did not attempt to account for the possible sinks of carbon dioxide (CO₂) that could balance the carbon cycle and produce atmospheric concentrations of CO₂ that match observations. A balanced carbon cycle model is applied in calculation of the radiative forcing from CO₂. Use of the balanced model produces up to 20 pct. enhancement of the GWP's for most trace gases compared with the EPCC (1990) values for time horizons up to 100 years, but a decreasing enhancement with longer time horizons. Uncertainty limits of the fertilization feedback parameter contribute a 10 pct. range in GWP values. Another systematic uncertainty in GWP's is the assumption of an equilibrium atmosphere (one in which the concentration of trace gases remains constant) versus a disequilibrium atmosphere. The latter gives GWP's that are 15 to 30 pct. greater than the former, depending upon the CO₂ emission scenario chosen. Seven scenarios are employed: constant emission past 1990 and the six EPCC (1992) emission scenarios. For the analysis of uncertainties in atmospheric lifetime (tau), the GWP changes in direct proportion to tau for short lived gases, but to a lesser extent for gases with tau greater than the time horizon for the GWP calculation. DOE

N93-17209# Oak Ridge National Lab., TN.

GLOBAL CLIMATE CHANGE: SOME IMPLICATIONS, OPPORTUNITIES, AND CHALLENGES FOR US FORESTRY

G. MARLAND 1991 16 p Presented at the 21st Southern Forest Tree Improvement Conference, Knoxville, TN, 17-20 Jun. 1991

(Contract DE-AC05-84OR-21400)

(DE92-040874; CONF-9106396-1) Avail: CASI HC A03/MF A01

It is widely agreed that the concentration of greenhouse gases in the earth's atmosphere is increasing, that this increase is a consequence of man's activities, and that there is significant risk that this will lead to changes in the earth's climate. The question is now being discussed what, if anything, we should be doing to minimize and/or adapt to changes in climate. Virtually every statement on this matter, from the US Office of Technology Assessment, to the National Academy of Science, to the Nairobi Declaration on Climatic Change, includes some recommendation for planting and protecting forests. In fact, forestry is intimately involved in the climate change debate for several reasons: changing climate patterns will affect existing forests, tropical deforestation is one of the major sources of greenhouse gases to the atmosphere, reforestation projects could remove additional carbon dioxide from the

atmosphere, and there is renewed interest in wood-based or other renewable fuels to replace fossil fuels. Part of the enthusiasm for forestry-related strategies in a greenhouse context is the perception that forests not only provide greenhouse benefits but also serve other desirable social objectives. This discussion will explore the current range of thinking in this area and try to stimulate additional thinking on the rationality of the forestry-based approaches and the challenges posed for US forestry. DOE

N93-18319# National Science Foundation, Washington, DC.

GLOBAL CHANGE RESEARCH PROGRAM: A COMPONENT OF THE US GLOBAL CHANGE RESEARCH PROGRAM. 1993 RESEARCH OPPORTUNITIES

1992 36 p Supersedes NSF-91-33 Original contains color illustrations

(NSF-92-77; NSF-91-33) Avail: CASI HC A03/MF A01

The necessity for understanding our global environment, its natural variability, and the changes imposed on it through human activities is recognized internationally. In the United States, the high priority placed by the Government on understanding the global environment led to the establishment of the U.S. Global Change Research Program. The program is an integrated research effort with the goal of establishing the scientific basis for national and international policymaking related to natural and human-induced changes in the global Earth system and their regional impacts. Within this program, the National Science Foundation, one of the funding agencies, is responsible for maintaining the health of basic research in all areas of solid Earth, atmospheric, ocean, terrestrial, and social sciences as well as research in polar regions. The basic research program is focused on ground-based studies on regional and global scales; large-scale field programs; interpretation and use of remotely sensed data and geographic information systems; theoretical and laboratory research; research facilities support; and the development of numerical models, information and communication systems, and data bases. Research opportunities with NSF are described. L.R.R.

N93-18405# Department of Energy, Washington, DC. Office of Health and Environmental Research.

GLOBAL CHANGE RESEARCH: SUMMARIES OF RESEARCH IN FY 1992

Oct. 1992 196 p

(DE93-002859; DOE/ER-0565T) Avail: CASI HC A09/MF A03

Greenhouse gases result from both natural and man-made processes and include carbon dioxide (CO₂), nitrogen oxides (N_xO_y), methane, chlorofluorocarbons, halogenated compounds, water vapor, and others. Since the industrial revolution, the atmospheric concentrations of several greenhouse gases have been increasing, primarily because of human activities. These increases have the potential to cause global climate change through increased radiative forcing. Global climate change is a significant issue for the Department of Energy (DOE) because energy production and use now contribute more than half of the total man-made emissions of greenhouse gases on a global basis. The missions of the Department's Global Change Research Program are: to predict the future atmospheric concentrations of CO₂ and other energy-related greenhouse gases; to predict the future and magnitude of potential climate change caused by the enhanced greenhouse effect; to understand both the direct impacts of greenhouse-gas emissions on biota and the indirect consequences produced by climate change; to assess the impacts of global climate change on energy systems and energy demand; and to develop and assess the potential of mitigation and adaptation technologies and practices to offset or limit the impact of any potential climate change or to facilitate natural and societal adjustment to the environmental, social, and economic consequences of global climate changes. The information produced by these activities is necessary in order to assess the economic and environmental costs and benefits of both potential climate change caused by the effects of greenhouse gases and implementing different technologies and energy-policy options aimed at preventing, mitigating, or adapting to such change. This document de-

45 ENVIRONMENT POLLUTION

scribes the activities and products of the Global Change Research Program in FY 1992. DOE

N93-18864 National Academy of Sciences - National Research Council, Washington, DC. Commission on Geosciences, Environment, and Resources.

THE US GLOBAL CHANGE RESEARCH PROGRAM: EARLY ACHIEVEMENTS AND FUTURE DIRECTIONS

JOHN S. PERRY 1992 23 p Sponsored in part by NSF, NASA, NOAA, US Geological Survey, US Dept. of Agriculture, Office of Naval Research, and DOE

(Contract NSF OCE-92-11921)

Copyright Avail: Issuing Activity

Almost a decade ago, a NASA-sponsored workshop called for a research initiative in the earth and life sciences directed at an intensely pragmatic question: How can we ensure the continuing habitability of our globe in the face of continued expansion in human numbers and activity? This question led to the development of massive national and international research programs that built on a long tradition of large-scale field programs in the earth sciences. Views on what has been accomplished over the last decade are presented. These views are drawn primarily from the author's experience. The following issues in which global change has made a discernible difference are discussed: ozone depletion; the biosphere and the climate system; aerosols and climate; el nino-southern oscillation; the global carbon cycle; understanding past environments; economic and other human dimensions; the biosphere; integrated modeling of the earth system; and linkage between science and policy.

Author

N93-19505# Colorado Univ., Boulder, CO. Cooperative Inst. for Research in Environmental Sciences.

THERMOHALINE CIRCULATIONS AND GLOBAL CLIMATE CHANGE Report, 15 Jan. - 14 Dec. 1992

H. P. HANSON 1992 6 p

(Contract DE-FG02-90ER-61019)

(DE93-004601; DOE/ER-61019/3) Avail: CASI HC A02/MF A01

This report discusses research activities conducted during the period 15 January 1992 to 14 December 1992. Thermohaline Circulations and Global Climate Change is concerned with investigating the hypothesis that changes in surface thermal and hydrological forcing of the North Atlantic, changes that might be expected to accompany CO₂-induced global warming, could result in ocean-atmosphere interactions' exerting a positive feedback on the climate system. Because the North Atlantic is the source of much of the global ocean's reservoir of deep water, and because this deep water could sequester large amounts of anthropogenically produced CO₂, changes in the rate of deep-water production are important to future climates. Since deep-water Production is controlled, in part, by the annual cycle of the atmospheric forcing of the North Atlantic, and since this forcing depends strongly on both hydrological and thermal processes as well as the windstress, there is the potential for feedback between the relatively short-term response of the atmosphere to changing radiative forcing and the longer-term processes in the oceans. Work over the past 11 months has proceeded according to the continuation discussion of last January and several new results have arisen.

DOE

N93-19940*# National Aeronautics and Space Administration, Washington, DC.

GLOBAL CHANGE INFORMATION SUPPORT: A NORTH-SOUTH COALITION

WALTER R. BLADOS and GLADYS A. COTTER Jan. 1993 13 p

(NASA-TM-108983; NAS 1.15:108983) Avail: CASI HC A03/MF A01

On a daily basis we become more aware that our planet, earth, exists in a delicate balance; we, its inhabitants, must be informed caretakers. Global change communities have emerged around the globe to address this multidisciplinary subject. Information systems

that integrate text, bibliographic, numeric and visual data are needed to support these global change communities. No one information center can hope to collect all the relevant data. Rather, we must form a coalition, North and South, to collect and provide access to disparate, multidisciplinary sources of information, and to develop standardized tools for documenting and manipulating this data and information. International resources need to be mobilized in a coordinated manner to move us towards this goal. This paper looks at emerging information technologies that can be utilized to build such a system, and outlines some cooperative North/South strategies.

Author

N93-21211# National Geophysical Data Center, Boulder, CO. World Data Center A for Solid Earth Geophysics.

GLOBAL CHANGE DATA BASE TRAINING EXERCISE MANUAL. EXPLORING EARTH'S ENVIRONMENT: AFRICA AS AN EXAMPLE

MICHELLE FULK, ed. (Clark Univ., Worcester, MA.) and DAVID HASTINGS, ed. Jun. 1992 167 p Sponsored in part by Interagency Working Group on Data Management for Global Change; International Geosphere-Biosphere Programme's Working Group on Data and Information Systems; and International Council of Scientific Unions Research

(PB92-224682; SE-48) Avail: CASI HC A08/MF A02

The manual attempts to provide economical and convenient ways for researchers and schools to explore the global environment, and to analyze phenomena of global change. The complete package includes the data base (extracted from the Global Change Data Base, supplemented with selected data sets for Africa), documentation for the data base, this workshop manual, and the user's choice of raster Geographic Information System (GIS) including its own documentation and training materials. Presently, most research on the global environment has focused on either localized detailed studies (such as with high-resolution satellite imagery), or very coarse-scale (2.5 to 5 degree resolution) regional and global modeling studies primarily of the oceans or atmosphere. In contrast, relatively little has been done at medium scales ranging from 1/4 to 100 km (approximately .3 to 60 arc-minutes), with the exception of pioneering work with the satellite-derived 'vegetation index' and other products derived from NOAA's AVHRR sensor. Other existing data sets at these medium scales are sketchily developed and inadequately accessible in usable form. Yet, information at this scale can reveal interesting phenomena that may be significant over nations, regions, continents, and the world. It can provide a useful context for high resolution studies of internal interest to many countries. Thus, it is with the goal of furthering research at this medium resolution, and linking it with work at the two extremes, that the Global Change Data Base has been inspired.

NTIS

N93-21695# Office of Science and Technology, Washington, DC.

US GLOBAL CHANGE DATA AND INFORMATION MANAGEMENT PROGRAM PLAN: A REPORT BY THE COMMITTEE ON EARTH AND ENVIRONMENTAL SCIENCES

24 Aug. 1992 107 p

(PB93-101293) Avail: CASI HC A06/MF A02

The importance of the effective management of data and information on global change has been highlighted by the U.S. Global Change Research Program (USGCRP) as an area requiring special emphasis. The importance was underlined by the establishment last year of a set of seven U.S. policy statements for global change data management, which form a basis for the report. In addition, the report responds to the several studies and reviews of the critical program area by the National Academy of Sciences. The report not only provides the framework for the global change data and information management program but commits the participating agencies to work with each other, with academia, and with the international community in its implementation. It also describes the programs of the participating agencies and outlines the next steps to be taken in the program.

NTIS

N93-21696# Federal Coordinating Council for Science, Engineering and Technology, Washington, DC. Committee on Earth and Environmental Sciences.

ECONOMICS AND GLOBAL CHANGE: THE FY 1993 RESEARCH PROGRAM ON THE ECONOMICS OF GLOBAL CHANGE. A SUPPLEMENT TO THE US PRESIDENT'S FY 1993 BUDGET AND A COMPANION DOCUMENT TO OUT CHANGING PLANET

Jan. 1992 69 p

(PB93-101244) Avail: CASI HC A04/MF A01

The report identifies three critical thrust areas for Fiscal Year 1993: (1) global economic models for the analysis of global environmental change; (2) uncertainty and the value of information; and (3) the economic effects of global change. Each thrust area identified in the year's program fills a critical need as the authors consider policy responses to global change. Our Nation's environmental and economic well-being is integrally linked to the actions and well-being of the rest of the world. Improved economic models are essential to improve understanding of these links and to the ability of the United States to develop and negotiate effective and cost-effective global environmental strategies.

Author

N93-22972# Oak Ridge National Lab., TN.

GLOBAL WARMING IMPACTS OF CFC ALTERNATIVE TECHNOLOGIES: COMBINING FLUOROCARBON AND CO2 EFFECTS

P. D. FAIRCHILD, S. K. FISCHER, and P. J. HUGHES 1992 14 p
Presented at the International Energy Agency (IEA) Heat Pump Center Workshop, Merligen, Switzerland, 12-13 Oct. 1992
(Contract DE-AC05-84OR-21400)

(DE93-002347; CONF-9210198-1) Avail: CASI HC A03/MF A01

Chlorofluorocarbons (CFCs) are on their way out, due to their role in stratospheric ozone depletion and the related international Montreal Protocol agreement and various national phaseout timetables. As the research, engineering development, and manufacturing investment decisions have ensued to prepare for this transition away from CFCs, the climate change issue has emerged and there has recently been increased attention on the direct global warming potential (GWP) of the fluorocarbon alternatives as greenhouse gases. However, there has been less focus on the indirect global warming effect arising from end-use energy changes and associated CO2 emissions. A study was undertaken to address these combined global warming effects. The concept of Total Equivalent Warming Impact (TEWI) was developed for combining the direct and indirect effects and was used for evaluating CFC-replacement options available in the required CFC transition time frame. Analyses of industry technology surveys indicate that CFC-user industries have made substantial progress toward near-equal energy efficiency with many HCFC/HFC alternatives. The findings also bring into question the relative importance of the direct effect in many applications and stress energy efficiency when searching for suitable CFC alternatives. For chillers, household refrigerators, and unitary air-conditioning or heat pump equipment, changes in efficiency of only 2-5 percent would have a greater effect on future TEWI than completely eliminating the direct effect.

DOE

N93-24015# Environmental Protection Agency, Research Triangle Park, NC. Atmospheric Research and Exposure Assessment Lab.
GENERAL CIRCULATION MODEL OUTPUT FOR FOREST CLIMATE CHANGE RESEARCH AND APPLICATIONS

ELLEN J. COOTER, BRIAN K. EDER, SHARON K. LEDUC, and LAWRENCE TRUPPI Nov. 1992 63 p

(PB93-124626; EPA/600/R-92/217) Avail: CASI HC A04/MF A01

General Circulation Models (GCM's) have projected global warming of from 3 to 8 degrees F to take place over a period of from 50 to 100 years. The Forest Service Southern Global Change Program (SGCP) has proposed the use of GCM output as input to forest assessment models to estimate the potential impacts of climate changes on forests of the South and Southeastern U.S. The report reviews, organizes, summarizes and makes recommenda-

tions concerning the use of four climate model projections in forest assessments. Some primary sources of inter-model variability include model version (age), numerical solution technique, time and space resolution, and parameterization schemes. Model version generally impacts the time and space resolution and choice of parameterization schemes. Magnitude of change varies widely, but the four GCM's examined here all project warmer air temperatures and higher humidities throughout the year, decreasing cloud cover during the Fall, Winter, and Spring seasons and increasing summertime precipitation for the South and Southeastern U.S. Although some consensus among models over large geographic regions can be identified, there is as yet, no established means of determining the confidence that can be placed in these outlooks. GCM output should be combined with historical case studies and empirical and semi-empirically constructed climate scenarios to provide a range of possible climatological futures.

Author

N93-24334# National Geophysical Data Center, Boulder, CO.

GLOBAL ECOSYSTEMS DATABASE. VERSION 1.0 (ON CD-ROM). EPA GLOBAL CLIMATE RESEARCH PROGRAM. NOAA/ NGDC GLOBAL CHANGE DATABASE PROGRAM. USER'S GUIDE. VOLUME 1. NGDC KEY TO GEOPHYSICAL RECORDS DOCUMENTATION NO. 26

J. J. KINEMAN Jun. 1992 138 p Sponsored by Corvallis Environmental Research Lab., OR

(PB93-146082; EPA/600/R-92/194A) Avail: CASI HC A07/MF A02

The user's guide gives a complete description of the overall project, including management, research, development, and review procedures that support the integration and improvement of this database, details of the database structure, organization of the CD-ROM, information on use with geographic information systems, and as information on links between the database and global change characterization and modeling.

NTIS

N93-24645# National Geophysical Data Center, Boulder, CO.

GLOBAL ECOSYSTEMS DATABASE. VERSION 1.0 (ON CD-ROM). EPA GLOBAL CLIMATE RESEARCH PROGRAM. NOAA/ NGDC GLOBAL CHANGE DATABASE PROGRAM. DOCUMENTATION MANUAL, DISC-A. VOLUME 1. NGDC KEY TO GEOPHYSICAL RECORDS DOCUMENTATION NO. 27

J. J. KINEMAN and M. A. OHRENSCHALL Jun. 1992 247 p
Sponsored by Corvallis Environmental Research Lab., OR

(PB93-146090; EPA/600/R-92/194B) Avail: CASI HC A11/MF A03

The Documentation Manual contains descriptive information about each data-set and exact file descriptions for each element in the data-set. The data-set descriptions are structured according to a precise template that is described in detail (Documentation Template Definitions). The Data-Set Description provides an in-depth identification and tracking of the data-set and its technical properties, and gives key references for the data-set. At the end of this description is a summary of any Data Integration and Quality work associated with the project. Such work may range from simple format conversion to complicated re-structuring, interpolation, and testing. A user's guide is provided as a separate document. In addition to their printed versions, the User's Guide and Documentation Manuals are provided in computer-readable form (bit-mapped image format) on the CD-ROM's. Reprints of the Primary References, including published journal articles, if applicable, are provided separately from the Documentation Manual as scanned image files on the CD-ROM. Reprints are assembled from available reports and publications, with permission from the authors and publishers. Only materials that are directly relevant to documenting the data-sets are reproduced.

NTIS

N93-24977# Los Alamos National Lab., NM.

ANALYSIS OF LARI SENSOR SYSTEM Final Report

RICHARD N. PFISTERER (Breault Research Organization, Tucson, AZ.), GARY L. PETERSON (Breault Research Organization, Tucson, AZ.), and ROBERT P. BREault (Breault Research Organization, Tucson, AZ.) 25 Nov. 1992 18 p Prepared in cooperation

45 ENVIRONMENT POLLUTION

with Breault Research Organization, Inc., Tucson, AZ
(Contract W-7405-ENG-36)
(DE93-006334; LA-SUB-93-4) Avail: CASI HC A03/MF A01

Los Alamos National Labs (LANL) is developing a new space sensor for examination of global warming effects. This sensor is called LARI (Los Alamos Radiometric Instrument) and is a next generation follow-on to the ERBE instrument launched several years ago. Breault Research Organization, Inc. (BRO) is pleased to offer engineering consulting services for the development of this sensor. The goal of the consultation is to assist LANL engineers with the conceptual design of the LARI instrument. While the contract specifically stated that computer analyses would not be performed, we felt that some minimum level of computation effort would add more substance to the conclusions. DOE

N93-25144# Oak Ridge National Lab., TN. Carbon Dioxide Information Analysis Center.

TRENDS '91: A COMPENDIUM OF DATA ON GLOBAL CHANGE. HIGHLIGHTS

THOMAS A. BODEN, ed., ROBERT J. SEPANSKI, ed., and
FREDERICK W. STOSS, ed. Mar. 1992 71 p
(Contract DE-AC05-84OR-21400)

(DE93-003112; ORNL/CDIAC-49) Avail: CASI HC A04/MF A01

The Carbon Dioxide Information Analysis Center (CDIAC) at Oak Ridge National Laboratory (ORNL) was prompted to produce the series Trends, a concise inventory of data in response to heightened concern about global environmental issues, in particular climate changes induced by the greenhouse effect. Extracts from Trends '91 are presented to illustrate the content, style, and presentation of data contained in the full 700-page report. A listing of the investigators contributing data for Trends '91 is included. In addition, it contains the abstract, foreword, and acknowledgements, as well as the introduction and a sample data record from each of the reports's five chapters. The topics covered are atmospheric CO₂, atmospheric CH₄, other trace gases, CO₂ emissions, and temperature. Appendix A provides information about CDIAC and its activities related to global environmental issues. Appendix B lists the contents of the full report. An order form for obtaining a free copy of Trends '91 is found in Appendix C. DOE

N93-25837# Mitre Corp., McLean, VA. Program Office.
SMALL SATELLITES AND RPA'S IN GLOBAL-CHANGE RESEARCH

P. BANKS, J. CORNWALL, F. DYSON, N. FORTSON, and R. GARWIN 1 Dec. 1992 207 p
(AD-A260762; JSR-91-330) Avail: CASI HC A10/MF A03

This report contains an investigation of those global change science problems that can be addressed by remotely piloted aircraft or by small satellites, including the relationship to the NASA EOS program. New types of measurements that could be made possible by such satellite or aircraft platforms are pointed out. Issues of technical feasibility and cost are examined, as well as the role of new technology developed through DOD and other programs. Possible joint DOD/Global Science satellite missions are also discussed. DTIC

N93-27410# Forest Service, Asheville, NC. Southeastern Forest Experiment Station.

SOUTHERN GLOBAL CHANGE PROGRAM. DETERMINING THE RELATIONSHIPS BETWEEN AIR POLLUTANTS, CLIMATE CHANGE, AND SOUTHERN FORESTS Forest Service General Technical Report

29 Mar. 1993 30 p
(PB93-176246; FSGTR-SE-79) Avail: CASI HC A03/MF A01

The Southeastern and Southern Forest Experiment Stations of the United States Department of Agriculture (USDA) Forest Service chartered a joint research initiative in 1990 called the Southern Global Change Program (SGCP). The SGCP was developed to improve our understanding of the interactions among southern forests, air pollution, and climate change. The SGCP will address questions about the ecological and socioeconomic impacts of global

change on the South, as well as questions about how management practices and policies should be modified in order to adapt to or mitigate these effects. The SGCP will provide information necessary to meet the challenge of maintaining forest health, productivity, and diversity in the face of global environmental change. This document describes the activities of the SGCP and identifies its relationship to the U.S. Global Change Research Program. NTIS

N93-29672# New Energy and Industrial Technology Development Organization, Tokyo (Japan).

TREND SURVEY ON THE ELUCIDATION OF THE GLOBAL WARMING MECHANISM BY THE GOVERNMENTS OF MAJOR INDUSTRIALIZED NATIONS

Mar. 1992 18 p

(DE93-776427; NEDO-ITE-9108) Avail: CASI HC A03/MF A01

This report reviewed 'Trend survey on the elucidation of the global warming mechanism in the governments of major industrialized nations', which has been conducted by EPDC (Electric Power Development Co.) in FY 1991 and is administered by NEDO. Presented are positive stances of the governments of major industrialized nations on their science and technology policies to carry out international tasks, such as global environmental issues, resources and energy problems, etc., or to strengthen their industrial competitive abilities. Also described are the energy policies of world nations, which reflect their global environmental policies and strategies. In taking approaches to global environmental issues of major nations, the U.S. administration spends by far the largest funds for survey and studies to elucidate the scientific mechanism of these problems, which is reflected in the U.S. policy of giving priority to the accumulation of scientific knowledge in dealing with problems of climate changes. Furthermore, a feasibility study on CO₂ recovery, transportation and disposal technologies is introduced, which is currently planned by the IEA. DOE

N93-30009# Oak Ridge National Lab., TN.

WHAT'S PAST IS PROLOGUE: SUPPORTING GLOBAL CHANGE RESEARCH WITH HISTORICAL DATA

R. B. HONEA, C. L. FLOYD (Communication and Information Technology, Inc., TN.), and R. W. PEPLIES (East Tennessee State Univ., Johnson City.) 1993 9 p Presented at the Annual Meeting of the American Society of Photogrammetry and Remote Sensing, New Orleans, LA, 16-18 Feb. 1993

(Contract DE-AC05-84OR-21400)

(DE93-005777; CONF-930244-2) Avail: CASI HC A02/MF A01

This paper discusses an ongoing effort to analyze historical remote sensing data and to develop a technology to integrate this analysis into a common framework with the satellite imagery. Historical data and metadata from aircraft remote sensor missions, satellite overflights, and other sources from around the world will be used to develop detailed information on the historical changes in the earth's land, water, and atmospheric resources. DOE

N94-13079# New York Univ., New York, NY. Dept. of Applied Science.

THE ROLE OF CLOUDS AND OCEANS IN GLOBAL GREENHOUSE WARMING

M. I. HOFFERT Dec. 1992 21 p

(Contract DE-FG02-90ER-61014)

(DE93-016206; DOE/ER-61014/3) Avail: CASI HC A03/MF A01

During the past three years we have conducted several studies using models and a combination of satellite data, in situ meteorological and oceanic data, and paleoclimate reconstructions, under the DoE program, 'Quantifying the Link Between Change in Radiative Balance and Atmospheric Temperature.' Our goals were to investigate the effects of global cloudiness variations on global climate and their implications for cloud feedback and continue development and application of NYU transient climate/ocean models, with emphasis on coupled effects of greenhouse warming and feedbacks by both the clouds and oceans. Our original research plan emphasized the use of cloud, surface temperature, and ocean data sets interpreted by focused climate/ocean models to develop a cloud radiative

forcing scenario for the past 100 years and to assess the transient climate response; to narrow key uncertainties in the system; and to identify those aspects of the climate system most likely to be affected by greenhouse warming over short, medium, and long time scales. DOE

N94-15896*# Oregon State Univ., Corvallis, OR. Coll. of Forestry.

DRIVING TERRESTRIAL ECOSYSTEM MODELS FROM SPACE
R. H. WARING In JPL, Proceedings of the Third Spaceborne Imaging Radar Symposium p 135-142 28 May 1993
Avail: CASI HC A02/MF A04

Regional air pollution, land-use conversion, and projected climate change all affect ecosystem processes at large scales. Changes in vegetation cover and growth dynamics can impact the functioning of ecosystems, carbon fluxes, and climate. As a result, there is a need to assess and monitor vegetation structure and function comprehensively at regional to global scales. To provide a test of our present understanding of how ecosystems operate at large scales we can compare model predictions of CO₂, O₂, and methane exchange with the atmosphere against regional measurements of interannual variation in the atmospheric concentration of these gases. Recent advances in remote sensing of the Earth's surface are beginning to provide methods for estimating important ecosystem variables at large scales. Ecologists attempting to generalize across landscapes have made extensive use of models and remote sensing technology. The success of such ventures is dependent on merging insights and expertise from two distinct fields. Ecologists must provide the understanding of how well models emulate important biological variables and their interactions; experts in remote sensing must provide the biophysical interpretation of complex optical reflectance and radar backscatter data.

Author (revised)

N94-16445# Pacific Northwest Lab., Richland, WA.
GLOBAL CHANGE RESEARCH: SCIENCE AND POLICY
S. RAYNER May 1993 20 p Presented at the Global Change Research: Science and Policy Meeting, Washington, DC, 17 May 1993
(Contract DE-AC06-76RL-01830)
(DE93-015675; PNL-SA-22390; CONF-9305219-1) Avail: CASI HC A03/MF A01

This report characterizes certain aspects of the Global Change Research Program of the U.S. Government, and its relevance to the short and medium term needs of policy makers in the public and private sectors. It addresses some of the difficulties inherent in the science and policy interface on the issues of global change. Finally, this report offers some proposals for improving the science for policy process in the context of global environmental change. DOE

N94-17289# California Univ., Berkeley. Lawrence Berkeley Lab, CA.
INCORPORATING GLOBAL WARMING RISKS IN POWER SECTOR PLANNING. VOLUME 1: A CASE STUDY OF THE NEW ENGLAND REGION
F. KRAUSE, J. BUSCH, and J. KOOMEY Nov. 1992 127 p
(Contract DE-AC03-76SF-00098)
(DE93-015241; LBL-30797-VOL-1) Avail: CASI HC A07/MF A02

Growing international concern over the threat of global climate change has led to proposals to buy insurance against this threat by reducing emissions of carbon (short for carbon dioxide) and other greenhouse gases below current levels. Concern over these and other, non-climatic environmental effects of electricity generation has led a number of states to adopt or explore new mechanisms for incorporating environmental externalities in utility resource planning. For example, the New York and Massachusetts utility commissions have adopted monetized surcharges (or adders) to induce emission reductions of federally regulated air pollutants (notably, SO₂, NO_x, and particulates) beyond federally mandated levels. These regulations also include preliminary estimates of the cost of reducing carbon emissions, for which no federal regulations

exist at this time. Within New England, regulators and utilities have also held several workshops and meetings to discuss alternative methods of incorporating externalities as well as the feasibility of regional approaches. This study examines the potential for reduced carbon emissions in the New England power sector as well as the cost and rate impacts of two policy approaches: environmental externality surcharges and a target-based approach. We analyze the following questions: Does New England have sufficient low-carbon resources to achieve significant reductions (10% to 20% below current levels) in fossil carbon emissions in its utility sector? What reductions could be achieved at a maximum? What is the expected cost of carbon reductions as a function of the reduction goal? How would carbon reduction strategies affect electricity rates? How effective are environmental externality cost surcharges as an instrument in bringing about carbon reductions? To what extent could the minimization of total electricity costs alone result in carbon reductions relative to conventional resource plans? DOE

N94-17762*# Nebraska Univ., Lincoln, NE. Dept. of Agricultural Meteorology.
BIOPHYSICAL CHARACTERIZATION AND SURFACE RADIATION BALANCE Final Report, 15 Sep. 1991 - 14 Sep. 1993

ELIZABETH A. WALTER-SHEA, BLAINE L. BLAD, MARK A. MESARCH, CYNTHIA J. HAYS, and PATRICK J. STARKS 14 Sep. 1993 97 p
(Contract NAG5-1762)
(NASA-CR-194659; NAS 1.26:194659) Avail: CASI HC A05/MF A02

The Kursk 1991 Experiment (KUREX-91) was conducted as one of a suite of international studies to develop capabilities to monitor global change. The studies were designed specifically to understand the earth's land-surface vegetation and atmospheric boundary layer interaction. An intensive field campaign was conducted at a site near Kursk, Russia during the month of July in 1991 by a team of international scientists to aid in the understanding of land-surface-atmosphere interactions in an agricultural/grassland setting. We were one of several teams of scientists participating at KUREX-91 at the Streletskaya Steppe Research near Kursk, Russia. The main goals of our research were to: (1) characterize biophysical properties of the prairie vegetation; and (2) characterize radiation regime through measurements and from estimates derived from canopy bidirectional reflectance data. Four objectives were defined to achieve these goals: (1) determine dependence of leaf optical properties on leaf water potential of some dominant species in discrete wavebands in the visible, near-infrared, and mid-infrared (spanning 0.4-2.3 microns range); (2) characterize the effective leaf area index (LAI) and leaf angle distribution of prairie vegetation; (3) characterize the radiation regime of the prairie vegetation through measures of the radiation balance components; and (4) examine, develop, and test methods for estimating albedo, APAR, and LAI from canopy bidirectional reflectance data. Papers which were the result of the research efforts are included.

Author (revised)

N94-19930# Pacific Northwest Lab., Richland, WA.
HEALTH EFFECTS OF GLOBAL WARMING: PROBLEMS IN ASSESSMENT

J. LONGSTRETH Jun. 1993 11 p Presented at the International Conference on Comparative Risks Analysis of Air Pollution Issues and Priority Setting, Denver, CO, 6-11 Jun. 1993
(Contract DE-AC06-76RL-01830)
(DE93-040323; PNL-SA-22711; CONF-930656-1) Avail: CASI HC A03/MF A01

Global warming is likely to result in a variety of environmental effects ranging from impacts on species diversity, changes in population size in flora and fauna, increases in sea level, and possible impacts on the primary productivity of the sea. Potential impacts on human health and welfare have included possible increases in heat related mortality, changes in the distribution of disease vectors, and possible impacts on respiratory diseases

45 ENVIRONMENT POLLUTION

including hayfever and asthma. Most of the focus thus far is on effects which are directly related to increases in temperature, e.g., heat stress or perhaps one step removed, e.g., changes in vector distribution. Some of the more severe impacts are likely to be much less direct, e.g., increases in migration due to agricultural failure following prolonged droughts. This paper discusses two possible approaches to the study of these less-direct impacts of global warming and presents information from on-going research using each of these approaches. DOE

N94-27430* Alabama Univ., Huntsville, AL.
GLOBAL CHANGE RESEARCH RELATED TO THE EARTH'S ENERGY AND HYDROLOGIC CYCLE Report No. 1, 1 Sep. 1993 - 28 Feb. 1994

DONALD J. PERKEY 10 Mar. 1994 72 p
(Contract NCC8-22)

(NASA-CR-195270; NAS 1.26:195270) Avail: CASI HC A04/MF A01

The following are discussed: Geophysical Modeling and Processes; Land Surface Processes and Atmospheric Interactions; Remote Sensing Technology and Geophysical Retrievals; and Scientific Data Management and Visual Analysis. CASI

N94-28473# Department of Energy, Washington, DC. Office of Energy Research.

GLOBAL CHANGE RESEARCH: SUMMARIES OF RESEARCH IN FY 1993

Oct. 1993 230 p

(DE94-003150; DOE/ER-0597T) Avail: CASI HC A11/MF A03

This document describes the activities and products of the Global Research Program in FY 1993. This publication describes all of the projects funded by the Environmental Sciences Division of DOE under annual contracts, grants, and interagency agreements in FY 1993. Each description contains the project's title; its 3-year funding history (in thousands of dollars); the period over which the funding applies; the name(s) of the principal investigator(s); the institution(s) conducting the projects; and the project's objectives, products, approach, and results to date (for most projects older than 1 year). Project descriptions are categorized within the report according to program areas: climate modeling, quantitative links, global carbon cycle, vegetation research, ocean research, economics of global climate change, education, information and integration, and NIGEC. Within these categories, the descriptions are grouped alphabetically by principal investigator. Each program area is preceded by a brief text that defines the program area, states its goals and objectives, lists principal research questions, and identifies program managers. DOE

N94-32790# Argonne National Lab., IL.
NATIONAL US PUBLIC POLICY ON GLOBAL WARMING DERIVED FROM OPTIMIZATION OF ENERGY USE AND ENVIRONMENTAL IMPACT STUDIES

R. RECK 1993 7 p Presented at the International Symposium on Environmental Policy for ESSD Achievement, Seoul, Republic of Korea, 22-23 Oct. 1993

(Contract W-31-109-ENG-38)

(DE94-004606; ANL/ER/CP-81397; CONF-9310249-1) Avail: CASI HC A02/MF A01

This paper will discuss possible United States policy responses to global warming. The components of a voluntary program for emissions control will be presented as well as regulatory options including a carbon tax and tradeable permits. The advantages and disadvantages of both options will be discussed as well as the need for a consistent overall policy response to climate change. DOE

N94-32817 Lawrence Livermore National Lab., Livermore, CA.
QUANTIFIED ESTIMATES OF TOTAL GWPS FOR GREENHOUSE GASES TAKING INTO ACCOUNT TROPOSPHERIC CHEMISTRY

D. J. WUEBBLES, J. S. TAMARESIS, and K. O. PATTEN Nov. 1993 130 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract W-7405-ENG-48)

(DE94-007846; UCRL-ID-115850) Avail: CASI HC A07

The purpose of this report is to give an interim account of the progress being made at Lawrence Livermore National Laboratory (LLNL) in developing an improved capability for assessing the direct and indirect effects on Global Warming Potentials. Much of our current efforts are being devoted to improving the capability for modeling of global tropospheric processes in our state-of-the-art zonally-averaged chemical radiative-transport model of the troposphere and stratosphere. These efforts are in preparation for an improved evaluation and better quantification of the indirect GWP's resulting from effects on tropospheric ozone from ethane and other gases with significant human-related emissions. There are three major findings that should result from this project that should have significant impacts on EPA and its programs. First, the current and ongoing studies of the direct and indirect GWP's should have a significant influence on the continuing national and international assessments of climate change. Second, the improved capability for modeling of chemical and physical processes should lead to enhanced understanding of the controlling factors influencing ozone, hydroxyl and other key tropospheric constituents. Third, the enhanced modeling capability should be important to future studies of human-related influences on tropospheric and stratospheric chemical processes. DOE

N94-32920 Institute of Energy Economics of Japan.

CURRENT POLICIES OF THE MAJOR COUNTRIES COPING WITH THE GLOBAL WARMING PROBLEM AND THE ENERGY DEMAND AND SUPPLY

10 Nov. 1993 193 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(DE94-757291; IEE-SR-248) Avail: CASI HC A09

Investigation and analysis were made of attitude maintained by the US, EC, Germany and France to cope with the global warming and energy problems after the conclusion of the Framework Convention on Climate Change. Intending to take large scale and long term measures, the US framed the Energy Policy Act, ratified the Convention and announced the Action Program. For the environmental protection, the EC maintains a positive attitude however with rather weak measures taken. All EC's program to decrease CO2 emissions aims at the compensation of decrease in East Germany for the increase in South Europe. However, if the carbon energy tax can not be introduced, it is difficult to achieve the aim. Germany has the most drastic aim established to decrease CO2 emissions by 25 to 30%. Even after achieving the aim, Germany will be equal to the present EC in CO2 emissions per person. Therefore, German people are judged to be not considerably sacrificial. Having positively introduced the nuclear power since the oil crisis, France is a developed country where CO2 emissions are very small per person, aiming at stabilization of the emissions. DOE

N94-35503* Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.

INSIGHT TO GLOBAL CHANGE: EOS/SAR MISSION (Videotape)

Jun. 1990 Videotape: 8 min. 30 sec. playing time, in color, with sound (NASA-CR-196133; NONP-NASA-VT-94-15911) Avail: CASI VHS A01/BETA A22

This video presentation describes the methods and instrumentation used to help in determining future climate changes on Earth and explains the benefits of experimentation with synthetic aperture radar (SAR). It also gives a better understanding of the burning of fossil fuels, deterioration of the biosphere and deforestation of the rain forest which causes the green house effect. CASI

N94-36987* National Academy of Sciences - National Research Council, Washington, DC. Commission on Behavioral and Social Sciences and Education.

SCIENCE PRIORITIES FOR THE HUMAN DIMENSIONS OF GLOBAL CHANGE

1994 42 p Sponsored in part by NASA, Washington, NOAA, Dept.

of Commerce, Geological Survey, Dept. of Interior, Dept. of Agriculture, Office of Naval Research, Dept. of Navy and DOE (Contract NSF OCE-93-13563)
 Avail: CASI HC A03/MF A01

The topics covered include the following: defining research needs; understanding land use change; improving policy analysis — research on the decision-making process; designing policy instruments and institutions to address energy-related environmental problems; assessing impacts, vulnerability, and adaptation to global changes; and understanding population dynamics and global change.
 Derived from text

N88-70493* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

THE GREENHOUSE EFFECT: PROJECTIONS OF GLOBAL CLIMATE CHANGE

J. HANSEN, A. LACIS, D. RIND, G. RUSSELL, I. FUNG, P. ASHCRAFT, S. LEBEDEFF, R. RUEDY, and P. STONE (Massachusetts Inst. of Tech., Cambridge.) In EPA, Effects of Changes in Stratospheric Ozone and Global Climate. Volume 1: Overview p 199-218 Aug. 1986
 Avail: CASI HC A03

N88-70502 Topping and Swillinger, Washington, DC.
CLIMATE CHANGE AND STRATOSPHERIC OZONE DEPLETION: NEED FOR MORE THAN THE CURRENT MINIMALIST RESPONSE

JOHN C. TOPPING, JR., In EPA, Effects of Changes in Stratospheric Ozone and Global Climate, Volume 1: Overview p 351-356 Aug. 1986
 Avail: CASI HC A02

N91-71330 Executive Office of the President, Washington, DC. Intergovernmental Panel on Climate Change.

AMERICA'S CLIMATE CHANGE STRATEGY: AN ACTION AGENDA

1990 24 p Original contains color illustrations
 Avail: CASI HC A03; 19 functional color pages

N91-71392 National Oceanic and Atmospheric Administration, Washington, DC.

REPORTS TO THE NATION ON OUR CHANGING PLANET. THE CLIMATE SYSTEM. WINTER 1991, NO. 1

1991 24 p Original contains color illustrations
 Avail: CASI HC A03; 22 functional color pages

N92-70346*# National Academy of Sciences - National Research Council, Washington, DC. Committee on Global Change.

TOWARD AN UNDERSTANDING OF GLOBAL CHANGE

1988 213 p Sponsored in part by NASA; NSF; NOAA; Geological Survey; USDA; Navy; and DOE (Contract DE-AI01-87ER-60574; NSF OCE-87-13699) (NASA-CR-190167; NAS 1.26:190167; DE92-004303; DOE/ER-60574/T1) Avail: CASI HC A10/MF A03

In the international scientific community, the International Council of Scientific Unions has organized the International Geosphere Biosphere Program (IGBP) to address the problems of global change. The objective of the IGBP is to describe and understand the interactive physical, chemical, and biological processes that regulate the total earth system, the unique environment that it provides for life, the changes that are occurring in this system, and the manner in which they are influenced by human activities. The IGBP is currently in its preparatory phase, during which the program's goals and research components are slowly evolving and coming into focus. In this report, a limited number of high-priority research initiatives are recommended for early implementation as part of the U.S. contribution to the preparatory phase of the IGBP. The recommendations are based on the committee's analysis of the most critical gaps, not being addressed by existing programs, in the scientific knowledge needed to understand the changes that are occurring in the earth system on time scales of decades to centuries.

These initiatives will build upon the capabilities of the U.S. program in global change.
 DOE

N92-70838 Lawrence Livermore National Lab., Livermore, CA.
EXPLORING GLOBAL CHANGE: THE BENEFITS AND DISADVANTAGES OF MICROSATELLITE, LIGHTSATELLITE, AND MEGASATELLITE ARCHITECTURES

M. NELSON Sep. 1990 126 p
 (Contract W-7405-ENG-48)
 (DE92-009513; UCRL-CR-107791) Avail: CASI HC A07/MF A02

This study is an attempt to assess the benefits and disadvantages of the various architectures for space-based global change research. These architectures include NASA's Megasatellite Earth Observing System (EOS), Lawrence Livermore's microsatellite constellation Brilliant Eyes (B.E.), and a number of other mixed satellite concepts. Before we explore the various means for implementing global change research, we must first examine the possible goals for such research. Once these goals have been explored, we can determine how well each mission architecture fulfills those goals. The main goals of the Mission to Planet Earth Global Change Research Program include scientific objectives, continuity, and horizontal simultaneity (global coverage). These goals and their development will be explored and expanded upon. Also discussed are the various instruments and instrument groupings that have been proposed for fulfilling the scientific objectives of the mission, the historic developments in satellite mass and cost, and the increasing interest in small satellites and the various benefits of such satellites. To support this assessment and further elucidate the costs and benefits of the various architectures, a database of space science and applications missions was assembled and a statistical analysis of the data was performed using SPSS/PC+ Studentware software. The data consists of all NASA space science and applications missions from 1958 through 1978 - the 'Golden Age' of space science. The data was limited to this time period because of the time constraints on this study. To enhance the quality of these findings, further work should be done to bring the data up to date.
 DOE

N93-71155*# Washington Univ., Seattle, WA. Geological Sciences.
SUDDEN CLIMATE CHANGE: THE LAND SURFACE RECORD Progress Report, period ending 31 Dec. 1992

ALAN GILLESPIE and JOHN ADAMS 1 Jan. 1993 29 p
 (Contract NAG5-1847)

(NASA-CR-191691; NAS 1.26:191691) Avail: CASI HC A03/MF A01

This project was conceived in response to NASA's stated goals to expand its studies to global scales, and to focus on problems relevant to climate or other global change. As proposed, our research was for three years, for a geologic and remote-sensing study of the onset of glacial conditions between approximately 115 and 50 ka. We proposed to study the regionally extensive land surface record, rather than the temporally detailed record provided by stratigraphic cores. This approach is useful because it enables the depiction of fossil weather patterns, but it lacks the resolution and detail of the point studies. We intended to study transitions in desert soil types, rock coatings, and palio ELA (equilibrium-line altitude) trend surfaces in Asia, western North America, and Australia. However, because of budgetary constraints, only 15 percent of the funding request was authorized, entailing a drastic downscape of the project. On the other hand, the project was augmented specifically to add a radar study of soil roughness and moisture in Queensland, Australia.
 Author

N93-71749 International Federation of Inst. for Advanced Study, Toronto (Ontario).

REPORT OF THE FRANCOPHONE AFRICAN WORKSHOP ON THE HUMAN DIMENSIONS OF GLOBAL CHANGE

OUMAR WANE (Universite Cheikh Anta Diop, Dakar, Senegal.) 1990 19 p Workshop held in Dakar, Senegal, 9-11 Oct. 1990 Sponsored by IDRC Prepared in cooperation with International Social Science Council, Paris, France; United Nations Univ., New York, NY; and United Nations Educational, Scientific and Cultural

45 ENVIRONMENT POLLUTION

Organization, Paris, France Original contains color illustrations (HDGCP-FA-001) Avail: CASI HC A03

The Francophone Africa Workshop on the Human Dimensions of Global Change was held in Dakar, Senegal from October 9-11, 1990 under the auspices of the Council for the Development of Economic and Social Research in Africa (CODSRIA) and the Institut des Sciences de l'Environnement of the Université Cheikh Anta Diop, Dakar. It is part of broad international consultation for the development of a program on global environmental change. The workshop brought together twenty-two specialists in all aspects of global environmental change from ten francophone African countries, including representatives from universities, governmental bodies, research centers and non-governmental organizations. The objectives of this meeting were to: initiate reflection within a multidisciplinary group; and define key issues for action and research in this part of Africa within the framework of the Human Dimensions of Global Change Programme (HDGCP). Author

N93-71957 International Federation of Inst. for Advanced Study, Toronto (Ontario).

THE HUMAN DIMENSIONS OF GLOBAL CHANGE: AN INTERNATIONAL PROGRAMME ON HUMAN INTERACTIONS WITH THE EARTH

PETER TIMMERMAN, comp. and ed. 1989 91 p Presented at the International Symposium on the Human Response to Global Change, Tokyo, Japan, 19-22 Sep. 1988 Sponsored in part by Ministry of Education; Ministry of Foreign Affairs; International Development Research Centre; Canadian International Development Agency; UN Development Program; UN Fund for Population Activities; and NSF Prepared in cooperation with International Social Science Council, Paris, France and United Nations Univ., New York, NY

Avail: CASI HC A05

The Human Dimensions of Global Change Program is being established as an international initiative to bring social scientists, natural scientists, and those involved in the management of human activities together in a set of research and related activities focused on key areas of human interaction with the earth. The Program has been under consideration from early 1987, and its work has reached a new point in its evolution with the successful completion of the Tokyo International Symposium, held from September 19-22, 1988, in Tokyo, Japan. The results of the International Symposium on Human Response to Global Change are presented.

N94-71231*# Rutgers - The State Univ., New Brunswick, N.J. Dept. of Human Ecology.

NEW TECHNOLOGY AND REGIONAL STUDIES IN HUMAN ECOLOGY: A PAPUA NEW GUINEA EXAMPLE

GEORGE E. B. MORREN, JR. In NASA. Stennis Space Center, Applications of Space-Age Technology in Anthropology p 137-165 1 May 1991 Sponsored by Wenner-Gren Foundation for Anthropological Research and American Philosophical Society Original contains color illustrations

Avail: CASI HC A03/MF A03; 20 functional color pages

Two key issues in using technologies such as digital image processing and geographic information systems are a conceptually and methodologically valid research design and the exploitation of varied sources of data. With this realized, the new technologies offer anthropologists the opportunity to test hypotheses about spatial and temporal variations in the features of interest within a regionally coherent mosaic of social groups and landscapes. Current research on the Mountain OK of Papua New Guinea is described with reference to these issues. Author

GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

N83-11639# Geological Survey, Washington, DC.

GEOGRAPHIC RESEARCH IN THE US GEOLOGICAL SURVEY: BIBLIOGRAPHY, 1966 - 1980

M. E. GRAZIANI 1982 63 p

(USGS-CIRC-865) Avail: CASI HC A04/MF A01

Geographic research, particularly research utilizing remotely sensed data is reported in approximately 390 references. Testing the use of satellite and high altitude remotely sensed data in a geographic context is covered. N.W.

N84-24038# National Academy of Sciences - National Research Council, Washington, DC. Commission on Physical Sciences, Mathematics, and Resources.

TOWARD AN INTERNATIONAL GEOSPHERE-BIOSPHERE PROGRAM: A STUDY OF GLOBAL CHANGE

1983 94 p Workshop held at Woods Hole, Mass., 25-29 Jul. 1983

(PB84-161769) Avail: CASI HC A05/MF A01

The connections between the Earth geosphere and biosphere are discussed. A cooperative interdisciplinary program in Earth sciences, on an international scale is proposed. NTIS

N86-20992*# National Academy of Sciences - National Research Council, Washington, DC. Committee for an International Geosphere-Biosphere Program.

GLOBAL CHANGE IN THE GEOSPHERE-BIOSPHERE: INITIAL PRIORITIES FOR AN IGBP

1986 104 p

(Contract NAS2-3985; NASW-4056; DE-FG05-84ER-602777; N00014-84-G-0196)

(NASA-CR-176519; NAS 1.26:176519) Avail: CASI HC A06/MF A02

Some of the factors are outlined that leads one to endorse the concept of focused, international geosphere-biosphere program, whose goal is to understand the interactive physical, chemical, and biological processes that regulate the Earth's unique environment for life, the changes that are occurring in this system, and the manner in which they are influenced by human actions. There is a pressing need to assess the consequence of human activities in the context of natural global change and to provide the body of knowledge necessary to chart a wise course to the future. A number of specific objectives were developed which leads to the conclusion that the need for new programs of observation of the Earth as a planet, a better understanding of the interactive processes that governs its changes, the development of a new generation of coupled modes, and the design of suitable tests to guide the development of these models and the understanding of the processes involved. Some general recommendations are summarized. Author

N90-27155*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

APPLICATIONS OF ISES FOR THE ATMOSPHERIC SCIENCES

JAMES M. HOELL, JR. In *its* Earth Sciences Requirements for the Information Sciences Experiment System p 145-158 Jul. 1990

Avail: CASI HC A03/MF A03

The proposed Information Sciences Experiment System (ISES) will offer the opportunity for real-time access to measurements acquired aboard the Earth Observation System (Eos) satellite. These measurements can then be transmitted to remotely located ground based stations. The application of such measurements to issues related to atmospheric science which was presented to a workshop convened to review possible application of the ISES in earth sciences is summarized. The proposed protocol for Eos

instruments requires that measurement results be available in a central data archive within 72 hours of acquiring data. Such a turnaround of raw satellite data to the final product will clearly enhance the timeliness of the results. Compared to the time that results from many current satellite programs, the 72 hour turnaround may be considered real time. Examples are discussed showing how real-time measurements from one or more of the proposed Eos instruments could have been applied to the study of certain issues important to global atmospheric chemistry. Each of the examples discussed is based upon a field mission conducted during the past five years. Each of these examples will emphasize how real-time data could have been used to alter the course of a field experiment, thereby enhancing the scientific output. For the examples, brief overviews of the scientific rationale and objectives, the region of operation, the measurements aboard the aircraft, and finally how one or more of the proposed Eos instruments could have provided data to enhance the productivity of the mission are discussed.

Author

N91-21640* Joint Oceanographic Inst., Inc., Washington, DC.
POLAR RESEARCH FROM SATELLITES

ROBERT H. THOMAS 1991 96 p Sponsored by NASA Original contains color illustrations (NASA-CR-188025; NAS 1.26:188025) Avail: CASI HC A05/MF A01; 8 functional color pages

In the polar regions and climate change section, the topics of ocean/atmosphere heat transfer, trace gases, surface albedo, and response to climate warming are discussed. The satellite instruments section is divided into three parts. Part one is about basic principles and covers, choice of frequencies, algorithms, orbits, and remote sensing techniques. Part two is about passive sensors and covers microwave radiometers, medium-resolution visible and infrared sensors, advanced very high resolution radiometers, optical line scanners, earth radiation budget experiment, coastal zone color scanner, high-resolution imagers, and atmospheric sounding. Part three is about active sensors and covers synthetic aperture radar, radar altimeters, scatterometers, and lidar. There is also a next decade section that is followed by a summary and recommendations section.

K.S.

N93-21686* International Geophysical Year World Data Center A, Boulder, CO.

GLOBAL CHANGE DATA BASE PILOT (DISKETTE) PROJECT FOR AFRICA. DASE BASE DOCUMENTATION VERSION 1.1

Jun. 1992 300 p Sponsored by National Geophysical Data Center, Boulder, CO (PB93-117927; SE-47) Avail: CASI HC A13/MF A03

The data base for Africa contains vegetation data, climate data, and other thematic data for a recent three and a half year period. The documentation contains separate chapters of material edited about separate data sets of the overall Global Change Data Base, Pilot (diskette) Project for Africa. Descriptions of data formats, authors, and contributors are accompanied by documentation of the development/use of the data. These materials have been suggested and contributed directly by the authors of the individual data sets. To avoid confusion, some information contained in the documentation that is not directly relevant to the data base has been either omitted, crossed out, or blanked out.

NTIS

N85-73230* Athenian School, Danville, CA.

SPACE SHUTTLE RADAR (SIR-A) VIEWS NEAR-EAST VOLCANOES

E. BLACKFORD, P. MOUGINIS-MARK (Hawaii Inst. of Geophysics), C. FERRALL (Hawaii Inst. of Geophysics), and L. GADDIS (Hawaii Inst. of Geophysics) Oct. 1983 12 p Submitted for publication refs

(Contract NAS7-100)

(NASA-CR-175944; NAS 1.26:175944) Avail: CASI HC A03

N93-70092 Pacific Northwest Lab., Richland, WA.

ATMOSPHERIC RADIATION MEASUREMENT: A PROGRAM

FOR IMPROVING RADIATIVE FORCING AND FEEDBACK IN GENERAL CIRCULATION MODELS

A. A. PATRINOS (Department of Energy, Washington, DC.), D. S. RENNE, G. M. STOKES, and R. G. ELLINGSON (Maryland Univ., College Park.) Jan. 1991 11 p Presented at the 71st Annual Meeting of the American Meteorological Society, New Orleans, LA, 13-18 Jan. 1991

(Contract DE-AC06-76RL-01830)

(DE92-014263; PNL-SA-18559; CONF-910143-6) Avail: CASI HC A03/MF A01

The Atmospheric Radiation Measurement (ARM) Program is a key element of the Department of Energy's (DOE's) global change research strategy. ARM represents a long term commitment to conduct comprehensive studies of the spectral atmospheric radiative energy balance profile for a wide range of cloud conditions and surface types, and to develop the knowledge necessary to improve parameterizations of radiative processes under various cloud regimes for use in general circulation models (GCM's) and related models. The importance of the ARM program is apparent from the results of model assessments of the impact on global climate change. Recent studies suggest that radiatively active trace gas emissions caused by human activity can lead to a global warming of 1.5 to 4.5 C and to important changes in water availability during the next century (Cess, et al. 1989). These broad-scale changes can be even more significant at regional levels, where large shifts in temperature and precipitation patterns are shown to occur. However, these analyses also indicate that considerable uncertainty exists in these estimates, with the manner in which cloud radiative processes are parameterized among the most significant uncertainty. Thus, although the findings have significant policy implications in assessment of global and regional climate change, their uncertainties greatly influence the policy debate. ARM's highly focused observational and analytical research is intended to accelerate improvements and reduce key uncertainties associated with the way in which GCM's treat cloud cover and cloud characteristics and the resulting radiative forcing. This paper summarizes the scientific context for ARM, ARM's experimental approach, and recent activities within the ARM program.

DOE

47

METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N84-34864* Oklahoma Univ., Norman, OK. School of Meteorology.

ANALYSIS OF LIDAR, RADAR AND SATELLITE MEASUREMENTS ON SEVERE THUNDERSTORMS AND THEIR ENVIRONMENTS

H. BLUESTEIN, R. J. DOVIAK (National Severe Storms Lab., Norman, Okla.), S. ZRNIC (National Severe Storms Lab., Norman, Okla.), R. RABIN (National Severe Storms Lab., Norman, Okla.), and A. SUNDARA-RAJAN In NASA. Marshall Space Flight Center NASA/MSFC FY-84 Atmospheric Processes Res. Rev. p 121-123 Sep. 1984 refs

Avail: CASI HC A10/MF A02

Intercomparison of wind data from the airborne Doppler lidar, ground-based Doppler radars, the 444 m NSSL-KTVY tower, and rawinsonde were completed. The vertical profile of wind in the PBL measured by the radars compared favorably with the profiles measured by the tower and rawinsonde while the one obtained from lidar data differed from the other three by as much as 3m/sec in wind speed and 38 degrees in direction. The time dependence of differences in wind estimates from radar and lidar suggested that these discrepancies could be attributed to a Schuler resonance in the aircraft's inertial navigation system which caused an erroneous component of the aircraft's velocity vector to be subtracted from the lidar radial velocities, thus creating errors in the synthesized wind

47 METEOROLOGY AND CLIMATOLOGY

speed and direction. The vertical profile of turbulent fluctuations of the horizontal wind detected by the different systems compared well. Also, spectra from the different sensing systems compared well in both magnitude and shape, suggesting that the lidar and radar detected similar turbulent structure. Author

N86-31190# Oak Ridge National Lab., TN.

HIERARCHY THEORY AND GLOBAL CHANGE

R. V. ONEILL 1985 27 p Presented at the Workshop on Global Change, St. Petersburg, Fla., 28 Oct. 1985

(Contract DE-AC05-84OR-21400)

(DE86-005154; CONF-8510284-1) Avail: CASI HC A03/MF A01

Hierarchy theory asserts that a useful way in which to deal with complex, multiscaled systems is to focus on a single phenomenon and a single time-space scale. By so limiting the problem, it is possible to define it clearly and choose the proper system to emphasize. This paper applies the theory to the problem of global change. DOE

N90-25447# National Oceanic and Atmospheric Administration, Washington, DC. Office of Research and Applications.

RESEARCH PROGRAMS: METEOROLOGICAL PREDICTION. OCEANIC PROCESSES. CLIMATE AND GLOBAL CHANGE MONITORING. SATELLITE INSTRUMENTATION AND CALIBRATION

Oct. 1989 144 p Original contains color illustrations

Avail: CASI HC A07/MF A02

Research projects of the National Environmental Satellite, Data, and Information Service (NESDIS) are summarized from their beginning with the launch of weather satellite TIROS-1 on April 1, 1960. NESDIS, part of the National Oceanic and Atmospheric Administration (NOAA), operates the civil polar-orbiting and geostationary satellite systems for the collection of environmental data. Since 1960, successive satellites in the Improved Tiros Operational Satellite (ITOS) program have grown in sophistication, and now include concurrent multiple-channel sensing on a daily basis. The Geostationary Operational Environmental Satellite (GOES) program began in 1974. GOES satellites collect visible and infrared imagery at half-hour intervals. These images can be animated, either photographically or electronically, to provide a continuous view of atmospheric and oceanic features. Recent GOES spacecraft have carried experimental multiple channel sensors that measure atmospheric water vapor, temperature, and carbon dioxide. New spacecraft sensors, algorithms for data processing and enhancement, as well as operational analysis and applications techniques keep improving the utility of satellite data for meteorological predictions, the study of oceanic processes, monitoring resources, climate, and global environmental changes. Many of these projects are described. J.P.S.

N90-28310# State Univ. of New York, Albany, NY. Dept. of Atmospheric Science.

SIZE, DURATION, AND RATE OF GROWTH OF NOCTURNAL LIGHTNING EVENTS APPEARING ON SPACE SHUTTLE VIDEO TAPES Final Report

CHRISTINE BRESLAWSKI Washington, DC NASA Aug. 1990 230 p

(Contract NAS8-32893)

(NASA-CR-4313; NAS 1.26:4313) Avail: CASI HC A11/MF A03

An analysis of video tapes of nocturnal lightning events, taken aboard space shuttle flights STS-8, STS-9, STS-41D, and STS-51J, shows flashes with dimensions ranging from approximately 1 km by 1 km to 440 km by 110 km. Of particular interest are the flashes whose dimensions exceeded 100 km, as flashes of this size are seldom reported. In general, larger flashes were found to have longer durations, take longer to reach their maximum extent, and reach their maximum extent at a smaller percent of their total duration than smaller flashes. Sixty four percent of the flashes occurred with one to five other events appearing in the same video frame. These simultaneous events were an average of 60 km apart from each other. If a breakdown process is propagating between the

simultaneous flashes, it would be travelling at a rate of $10(\exp 5)m/sec$. Plots of the area of an event over its duration show peaks in the area curve which may be indicative of lightning strokes. There was an average of 3.6 peaks per flash. In general, the longer the flash duration, the more peaks there were in the area curve. The area curves of the lightning events fall into one of five shape categories. It is suggested that the shape of the area curve may indicate whether an event is an intracloud or cloud to ground lightning flash. Some of the lightning events had a persistent bright spot. These events had an average duration which was greater than that of events without the bright spot. On average, the bright spot events had a maximum area which was larger than that of the flashes without the bright spot.

Author

N91-17504# World Meteorological Organization, Geneva (Switzerland). World Climate Data Program.

THE GLOBAL CLIMATE SYSTEM: CLIMATE SYSTEM MONITORING, JUNE 1986 TO NOVEMBER 1988

Nov. 1988 73 p Original contains color illustrations

(CSM-R-84/86) Avail: CASI MF A01; print copy available at WMO, Geneva, Switzerland

This report is based on current scientific understanding of the climate system and provides a basis for the monitoring of global change. Due to deficiencies in the global observing system, the diagnostic analyses of cause-effect relationships are preliminary for some regions and some climatic events or processes. It is hoped that the review will promote further research and better observing systems that would lead to improved models of the complex interactive processes occurring within the climate system. An extensive bibliography is provided at the end of the report for further reading. The topics covered include: (1) a moderate warm episode of the southern oscillation in 1986 to 1987 followed by a pronounced cold phase in 1988; (2) global mean temperatures rise despite some cold anomalies at higher latitudes; (3) major droughts plague food-producing areas; (4) near-normal rainfall finally returns to the Sahel in 1988; (5) dramatic failure of the Indian monsoon in 1987 but ample rains in 1988 while variable conditions occur in other monsoon areas; (6) increase in trace gases in the atmosphere continues; (7) stratospheric ozone depletion; (8) atmospheric aerosol concentrations stabilize; (9) increased tropical storm activity in the Eastern Atlantic in 1988; (10) pronounced upper-atmosphere blocking during the autumn and winter of 1987 to 1988 in the Northern Hemisphere; (11) notable rising trend in the sea-surface temperatures of the northwest part of the subtropical Pacific Ocean; (12) rapid drop in Great Lakes water levels to near-normal values; (13) a decrease in global cloudiness in 1987 and 1988; (14) little change in global ice cover but reduced snow cover in 1988; (15) significant rise in global sea level; (16) increasing desertification in China; (17) new evidence relating the solar cycle to variations in the atmosphere; and (18) seasonal summaries. Author

N91-25557# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

SATELLITE ORBIT CONSIDERATIONS FOR A GLOBAL CHANGE TECHNOLOGY ARCHITECTURE TRADE STUDY

EDWIN F. HARRISON (National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.), GARY G. GIBSON (Lockheed Engineering and Sciences Co., Hampton, VA.), JOHN T. SUTTLES (National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.), JAMES J. BUGLIA (National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.), and ISRAEL TABACK (Bionetics Corp., Hampton, VA.) May 1991 18 p

(Contract RTOP 673-53-01-70)

(NASA-TM-104081; NAS 1.15:104081) Avail: CASI HC A03/MF A01

A study was conducted to determine satellite orbits for earth observation missions aimed at obtaining data for assessing data global climate change. A multisatellite system is required to meet the scientific requirements for temporal coverage over the globe. The best system consists of four sun-synchronous satellites equally spaced in local time of equatorial crossing. This system can obtain

from the use of data from gauges located at convergent tectonic plate boundaries where changes of land elevation give fictitious sea level trends, and the effects of large interdecadal and longer sea level variations on short (less than 50+ years) or sappy records. In addition, virtually all gauges undergo subsidence or uplift due to isostatic rebound from the last deglaciation at a rate comparable to or greater than the secular rise of sea level. Modeling rebound by the ICE-3G model of Tushingham and Peltier (1990) and avoiding tide gauge records in areas of converging tectonic plates produces a highly consistent set of long sea level records. A global set of 21 such stations in nine oceanic regions with an average record length of 76 years during the period 1880-1980 yields the global sea level rise value 1.8 mm/year \pm 0.1. Greenhouse warming scenarios commonly forecast an additional acceleration of global sea level in the next 5 or 6+ decades in the range 0.1-0.2 mm/yr². Because of the large power at low frequencies in the sea level spectrum, very long tide gauge records (75 years minimum) have been examined for past apparent sea level acceleration. For the 80-year period 1905-1985, 23 essentially complete tide gauge records in 10 geographic groups are available for analysis. These yielded the apparent global acceleration -0.011 (\pm 0.012) mm/yr². A larger, less uniform set of 37 records in the same 10 groups with 92 years average length covering the 141 years from 1850-1991 gave 0.001 (\pm 0.008) mm/yr². Thus there is no evidence for an apparent acceleration in the past 100+ years that is significant either statistically, or in comparison to values associated with global warming. Unfortunately, the large interdecadal fluctuations of sea level severely affect estimates of global sea level acceleration for time spans of less than about 50 years. This means that tide gauges alone cannot serve as a reliable leading indicator of climate change in less than many decades. This time required can be significantly reduced if the interdecadal fluctuations of sea level can be understood in terms of their forcing mechanisms, and then removed from the tide gauge records.

Author

N93-29670 American Chemical Society, Washington, DC.
CHEMISTRY OF THE ATMOSPHERE: ITS IMPACT ON
GLOBAL CHANGE. CHEMRAWN 7: PERSPECTIVES AND
RECOMMENDATIONS

JOHN W. BIRKS, ed., JACK G. CALVERT, ed., and ROBERT E. SIEVERS, ed. 1992 168 p The International Conference on the Chemistry of the Atmosphere, Baltimore, MD, 2-6 Dec. 1991 Prepared in cooperation with American Chemical Society, Washington, DC Sponsored by Agency for International Development, Washington, DC, Office of Energy and Infrastructure (PB93-180644; AID-PN-ABM-278) Copyright Avail: Issuing Activity

Contents: An Approach to Global Climatic Change: A U.S. Perspective; Atmospheric Chemistry and Global Change: The Scientist's Viewpoint; Global Environmental Change Overview: Developing Countries; Control of Global Change: Industrial View; Control of Global Climate Alteration: Power Industry Perspective; Future Energy Sources and the Atmospheric Challenges for Research and Development; International Cooperation and Some Research Needs to Improve Our Understanding of the Chemistry of the Atmosphere; Global Change and the Role of Governments.

NTIS

N94-16760*# INTERA Technologies Ltd., Nepean (Ontario).
SOIL CONSERVATION APPLICATIONS WITH C-BAND SAR
 B. BRISCO, R. J. BROWN (Canada Centre for Remote Sensing, Ottawa, Ontario.), J. NAUNHEIMER, and D. BEDARD In JPL, Summaries of the Third Annual JPL Airborne Geoscience Workshop. Volume 3: AIRSAR Workshop p 86-88 1 Jun. 1992 Avail: CASI HC A01/MF A02

Soil conservation programs are becoming more important as the growing human population exerts greater pressure on this non-renewable resource. Indeed, soil degradation affects approximately 10 percent of Canada's agricultural land with an estimated loss of 6,000 hectares of topsoil annually from Ontario farmland alone. Soil

loss not only affects agricultural productivity but also decreases water quality and can lead to siltation problems. Thus, there is a growing demand for soil conservation programs and a need to develop an effective monitoring system. Topography and soil type information can easily be handled within a geographic information system (GIS). Information about vegetative cover type and surface roughness, which both experience considerable temporal change, can be obtained from remote sensing techniques. For further development of the technology to produce an operational soil conservation monitoring system, an experiment was conducted in Oxford County, Ontario which investigated the separability of fall surface cover type using C-band Synthetic Aperture Radar (SAR) data.

Author (revised)

N94-32881 Lawrence Livermore National Lab., Livermore, CA.
OCEAN VARIABILITY AND ITS INFLUENCE ON THE
DETECTABILITY OF GREENHOUSE WARMING SIGNALS
 B. D. SANTER, U. MIKOLAJEWICZ, W. BRUEGGEMANN, K. HASSELMANN, H. HOECK, E. MAIER-REIMER, and U. CUBASCH Jan. 1994 75 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality (Contract W-7405-ENG-48) (DE94-008670; UCRL-ID-115329; PCMDI-14) Avail: CASI HC A04

Recent investigations have considered whether it is possible to achieve early detection of greenhouse-gas-induced climate change by observing changes in ocean variables. In this study, we use model data to assess some of the uncertainties involved in estimating when we could expect to detect ocean greenhouse warming signals. We distinguish between detection periods and detection times. As defined here, detection period is the length of a climate time series which must be available in order to detect a given linear trend in the presence of the natural climate variability. Detection period is defined in model years and is independent of reference time and the real time evolution of the signal. Detection time is computed for an actual time-evolving signal from a greenhouse warming experiment and depends on the experiment's start date. Two sources of uncertainty are considered - those associated with the level of natural variability or noise, and those associated with the time-evolving signals. We analyze the ocean signal and noise for spatially-averaged ocean circulation indices such as ice volume, heat and fresh water fluxes, rate of deep water formation, salinity, temperature, and transport of mass. The signals for these quantities are taken from recent time-dependent greenhouse warming experiments performed by the Hamburg group with a coupled ocean-atmosphere general circulation model. The natural variability noise is derived from a 300-year control run performed with the same coupled atmosphere-ocean model and from two long (greater than 3,000 year) stochastic forcing experiments in which an uncoupled ocean model was forced by white noise surface flux variations. In the first experiment the stochastic forcing was restricted to the fresh water fluxes, while in the second experiment the ocean model was additionally forced by variations in wind stress and heat fluxes. The mean states and ocean variability are very different in the three natural variability integrations.

DOE

53

BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N84-20154*# Maryland Univ., College Park, MD. Remote Sensing Systems Lab.
REMOTE SENSING TRAINING FOR CORPS OF ENGINEERING PERSONNEL: THE UNIVERSITY TRAINING MODULE

CONCEPT Final Report, Jul. 1981 - Jul. 1982

Aug. 1982 34 p Sponsored in part by Corps of Engineers refs (Contract NAS5-26650)

(NASA-CR-175204; NAS 1.26:175204) Avail: CASI HC A03/MF A01

A concept to permit Corps of Engineers personnel to obtain and maintain an appropriate level of individual proficiency in the application of remote sensing to water resource management is described. Recommendations are made for specific training courses and include structure and staffing requirements, syllabi and methods of operation, supporting materials, and procedures for integrating information systems management into the University Training Modules.

Author

54

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N94-71223* National Aeronautics and Space Administration. John C. Stennis Space Center, Bay Saint Louis, MS.

APPLICATIONS OF SPACE-AGE TECHNOLOGY IN ANTHROPOLOGY

1 May 1991 251 p Conference held in Bay Saint Louis, MS, 28 Nov. 1990 Original contains color illustrations (NASA-TM-109395; NAS 1.15:109395) Avail: CASI HC A12/MF A03; 20 functional color pages

The papers in this volume were presented at a conference entitled, 'Applications of Space-Age Technology in Anthropology,' held November 28, 1990, at NASA's Science and Technology Laboratory. One reason for this conference was to facilitate information exchange among a diverse group of anthropologists. Much of the research in anthropology that has made use of satellite image processing, geographical information systems, and global positioning systems has been known to only a small group of practitioners. A second reason for this conference was to promote scientific dialogue between anthropologists and professionals outside of anthropology. It is certain that both the development and proper application of new technologies will only result from greater cooperation between technicians and 'end-users.' Anthropologists can provide many useful applications to justify the costs of new technological development.

61

COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms, and specific applications, e.g., CAD/CAM.

N89-27367* Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

SATELLITE IMAGE PROCESSING USING SYMBOLIC STRUCTURES OF REDUCED VISION CONDITIONS M.S. Thesis [PROCESSAMENTO DE IMAGENS DE SATELITE USANDO ESTRUTURAS SIMBOLICAS DO BAIXO NIVEL DA VISAO]

ANTONIO MIGUEL VIEIRAMONTEIRO Aug. 1988 110 p In PORTUGUESE; ENGLISH summary (INPE-4638-TDL/337) Avail: CASI HC A06/MF A02

In automatic satellite image processing, tasks such as segmentation of the image into meaningful objects and even classification have been commonly performed using as input the raw satellite image (except for restoration and other cosmetic operations). In many cases the results obtained have not been very good, especially when compared with the performance of (human) photointerpreters in the same tasks. The increase in spatial resolution of recent satellites has added to the problem rather than improved it. Proposed here is the adoption of current models of human visual perception as the paradigm to organize processing systems for satellite images. In particular it is proposed that the Primal Sketch, as defined by David Marr, be the starting point of the processing instead of the raw image. Some experiments using the Primal Sketch to perform segmentation of satellite imagery are shown, and the applicability of the method is discussed.

Author

N91-23733 Wisconsin Univ., Madison, WI.

THE INTEGRATION OF REMOTE SENSING, GEOGRAPHIC INFORMATION SYSTEM, AND EXPERT SYSTEM TECHNOLOGIES FOR LANDCOVER CLASSIFICATION Ph.D. Thesis

PAUL VICTOR BOLSTAD 1990 338 p

Avail: Univ. Microfilms Order No. DA9030781

Approaches to supervised, computer-aided landcover mapping were developed which incorporate satellite imagery and spatial data with remote sensing, geographic information system, and artificial intelligence techniques. These approaches were developed in response to observed deficiencies in current standard computer-aided classification methodologies, both in the time and level of expertise requirements for human image-analysts, and in classification accuracies. These approaches were directed at both the training and classification stages of supervised landcover mapping. The first approach facilitates the maintenance and application of general and specific knowledge in training set selection and refinement. The second approach involved the integration of thematic spatial and image data in landcover classification. Spatial data operators, image and thematic spatial data, and knowledge of the relationships between cover types and thematic data are combined using expert system techniques. Results from comparative tests of classification accuracies based on two study sites, two different operators, and two image dates indicate that the new approaches provide significantly higher classification accuracies with less analyst input when compared to traditional techniques over a range of conditions.

Dissert. Abstr.

N94-28259* Centre National d'Etudes Spatiales, Toulouse (France).

A COMPARATIVE STUDY OF SAR DATA COMPRESSION SCHEMES

C. LAMBERT-NEBOUT, O. BESSON (Ecole Nationale Supérieure d'Ingenieurs de Constructions Aeronautiques, Toulouse, France.), D. MASSONNET, and B. ROGRON In NASA. Goddard Space Flight Center, The 1994 Space and Earth Science Data Compression Workshop p 81-91 Apr. 1994

Avail: CASI HC A03/MF A02

The amount of data collected from spaceborne remote sensing has substantially increased in the last years. During same time period, the ability to store or transmit data has not increased as quickly. At this time, there is a growing interest in developing compression schemes that could provide both higher compression ratios and lower encoding/decoding errors. In the case of the spaceborne Synthetic Aperture Radar (SAR) earth observation system developed by the French Space Agency (CNES), the volume of data to be processed will exceed both the on-board storage capacities and the telecommunication link. The objective of this paper is twofold: to present various compression schemes adapted to SAR data; and to define a set of evaluation criteria and compare the algorithms on SAR data. In this paper, we review two classical methods of SAR data compression and propose novel approaches based on Fourier Transforms and spectrum coding.

Author (revised)

SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N94-11572* Dynamics Research Corp., Arlington, VA.
MORE SENSE FOR LESS CENTS: COST EFFECTIVE SERVICING OF REMOTE SENSING SATELLITES Abstract Only

JEANNIE LEE, TOM MISENCIK, BILL ROBERTSON, and JACK SLINNEY In NASA. Johnson Space Center, Sixth Annual Workshop on Space Operations Applications and Research (SOAR 1992), Volume 2 p 701 Feb. 1993
Avail: CASI HC A01/MF A03

This paper addresses the design considerations for Earth observation spacecraft bus and payload subsystems such that cost-effective spacecraft maintainability is enhanced through optimized reliability and the application of robotic on-orbit support. In the past, for most satellites, maintainability has been associated with the clever application of telemetry reconfiguration and the use of redundant systems as necessary over the life cycle of the spacecraft. This presentation addresses the opportunities and challenges of leveraging the extensive work already accomplished in the development of on-orbit servicing technologies. Author (revised)

N94-23868* Cray Systems, Bristol (England).
MISSION PLANNING FOR AN EARTH OBSERVATION LOW EARTH ORBITER: ERS-1

PAUL LOCKYER In JPL, SpaceOps 1992: Proceedings of the Second International Symposium on Ground Data Systems for Space Mission Operations p 231-236 1 Mar. 1993
Avail: CASI HC A02/MF A10

ERS-1, the first European Remote Sensing satellite, has a payload which consists primarily of microwave instruments and is in a polar sun-synchronous orbit. All ground and on-board activities from user requests to delivery of data products are combined into one integrated system. In view of the high number of products which can be generated by ERS-1, the Mission Planning System (MPS), which plans the on-board activities of ERS-1, is an essential tool for operations since manual planning of the large number of daily operations is out of the question. In addition the MPS, in line with the integrated nature of the ERS-1 system, also plans activities at the prime ground station, including among others, the operation of the payload data processing systems there. This paper outlines the operations concepts for ERS-1 mission planning, and describes the Mission Planning System used at the ERS-1 Control Center. Novel functionalities, such as automatic resource clash resolution, are described. A critical discussion gives lessons learned for future mission planning systems. Author (revised)

DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.

N84-20434* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

RESEARCH AND TECHNOLOGY, FISCAL YEAR 1983 Annual Report

1983 101 p
(NASA-TM-85557; NAS 1.15:85557) Avail: CASI HC A06/MF A02

The responsibilities and programs of the Goddard Space Flight Center are ranged from basic research in the space and Earth sciences through the management of numerous flight projects to operational responsibility for the tracking of and data acquisition

from NASA's Earth orbiting satellites, Progress in the areas of spacecraft technology, sensor development and data system development, as well as in the basic and applied to research in the space and Earth sciences that they support is highlighted. A.R.H.

N85-28877* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

EXPERIMENTAL PHILOSOPHY LEADING TO A SMALL SCALE DIGITAL DATA BASE OF THE CONTERMINOUS UNITED STATES FOR DESIGNING EXPERIMENTS WITH REMOTELY SENSED DATA

M. L. LABOVITZ, E. J. MASUOKA, P. W. BRODERICK, T. R. GARMAN, R. W. LUDWIG, G. N. BELTRAN, P. J. HEYMAN, and L. K. HOOKER Apr. 1983 22 p refs
(NASA-TM-85009; NAS 1.15:85009) Avail: CASI HC A03/MF A01

Research using satellite remotely sensed data, even within any single scientific discipline, often lacked a unifying principle or strategy with which to plan or integrate studies conducted over an area so large that exhaustive examination is infeasible, e.g., the U.S.A. However, such a series of studies would seem to be at the heart of what makes satellite remote sensing unique, that is the ability to select for study from among remotely sensed data sets distributed widely over the U.S., over time, where the resources do not exist to examine all of them. Using this philosophical underpinning and the concept of a unifying principle, an operational procedure for developing a sampling strategy and formal testable hypotheses was constructed. The procedure is applicable across disciplines, when the investigator restates the research question in symbolic form, i.e., quantifies it. The procedure is set within the statistical framework of general linear models. The dependent variable is any arbitrary function of remotely sensed data and the independent variables are values or levels of factors which represent regional climatic conditions and/or properties of the Earth's surface. These factors are operationally defined as maps from the U.S. National Atlas (U.S.G.S., 1970). Eighty-five maps from the National Atlas, representing climatic and surface attributes, were automated by point counting at an effective resolution of one observation every 17.6 km (11 miles) yielding 22,505 observations per map. The maps were registered to one another in a two step procedure producing a coarse, then fine scale registration. After registration, the maps were iteratively checked for errors using manual and automated procedures. The error free maps were annotated with identification and legend information and then stored as card images, one map to a file. A sampling design will be accomplished through a regionalization analysis of the National Atlas data base (presently being conducted). From this analysis a map of homogeneous regions of the U.S.A. will be created and samples (LANDSAT scenes) assigned by region. R.J.F.

N91-21973* Army Engineer Topographic Labs., Fort Belvoir, VA.
SCAN-LINE METHODS IN SPATIAL DATA SYSTEMS Scientific Paper, 23-27 Jul. 1990

MICHAEL MCDONNELL 4 Sep. 1990 12 p
(AD-A231165; ETL-R-152) Avail: CASI HC A03/MF A01

This paper examines a method of manipulating data in grid cell spatial data management systems such as Geographic Information Systems (GIS) and digital cartographic systems. While scan line methods have advantages when used only in traditional GIS operations such as manipulation of region polygons (binary overlays), much of this paper discusses digital imagery, digitized map backgrounds, and other types of pictorial or multibit data. This is because the integration of these kinds of data with GIS will become more prevalent and because scan-line techniques are especially useful for pictorial data. The incorporation of remote sensing data into GIS is a major current issue. Jensen notes that the full potential of remote sensing and GIS can best be achieved if the technologies are integrated. Remote sensing data consists mostly of digitized photography, so it is important to be able to handle photographic data in a GIS. Modern digital cartography entails the handling of ever-larger

data sets. And it may take many of these data sets to cover a region of interest. This amount of data cannot be handled well on present computer systems, and extrapolation of computer capabilities shows that handling large amounts of data will be difficult for many years to come.

DTIC

N92-15473* National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.

INFORMATION DATA SYSTEMS FOR A GLOBAL CHANGE TECHNOLOGY INITIATIVE ARCHITECTURE TRADE STUDY

NICHOLAS D. MURRAY *In its Global Change Technology Architecture Trade Study* p 309-338 Sep. 1991

Avail: CASI HC A03/MF A04

The Global Change Technology Initiative (GCTI) was established to develop technology which will enable use of satellite systems of Earth observations on a global scale, enable use of the observations to predictively model Earth's changes, and provide scientists, government, business, and industry with quick access to the resulting information. At LaRC, a GCTI Architecture Trade Study was undertaken to develop and evaluate the architectural implications to meet the requirements of the global change studies and the eventual implementation of a global change system. The output of the trade study are recommended technologies for the GCTI. That portion of the study concerned with the information data system is documented. The information data system for an earth global change modeling system can be very extensive and beyond affordability in terms of today's costs. Therefore, an incremental approach to gaining a system is most likely. An options approach to levels of capability versus needed technologies was developed. The primary drivers of the requirements for the information data system evaluation were the needed science products, the science measurements, the spacecraft orbits, the instruments configurations, and the spacecraft configurations and their attendant architectures. The science products requirements were not studied here; however, some consideration of the product needs were included in the evaluation results. The information data system technology items were identified from the viewpoint of the desirable overall information system characteristics.

Author

N92-32227* Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

GIS: GEOGRAPHIC INFORMATION SYSTEMS. STATE OF THE ART AND FUTURE TENDENCIES [SIG: SISTEMAS DE INFORMACOES GEOGRAFICAS. ESTADO DA ARTE E TENDENCIAS FUTURAS]

HERMANN JOHANN HEINR KUX 1991 35 p In PORTUGUESE (INPE-5358-NTC/301) Avail: CASI HC A03/MF A01

The objective of this article is to inform on commercial geographical information systems (GIS) currently available on the market. Common characteristics of today's GIS's are presented and a prediction concerning the next product generation is made.

Author

N93-11789* Zambia Univ., Lusaka. Dept. of Surveying. **PROCEEDINGS OF THE FIRST SEMINAR ON GEOGRAPHIC INFORMATION SYSTEMS IN ZAMBIA**

1992 98 p Seminar held in Lusaka, Zambia, 9 Jan. 1991 Prepared in cooperation with Ministry of Water, Lands and Natural Resources, Lusaka, Zambia

(PB92-207125; ISBN-90-5271-009-0) Avail: CASI HC A05/MF A02

Contents: Concepts of GIS; Data Sources for Geographic Information Systems; Data Processing and Presentation; The Role of GIS in Decision Support Systems - A Management Perspective; Implementation of GIS in Zambia; The Landeval Geographical Information System (LGIS); International Cooperation in GIS, Photogrammetry and Remote Sensing.

Author

N93-12660* Consortium for International Earth Science Information Network, Ann Arbor, MI.

EARTH SCIENCE INFORMATION: PLANNING FOR THE INTEGRATION AND USE OF GLOBAL CHANGE INFORMATION Semiannual Status Report, 1 Jan. - 30 Jun. 1992

JACK R. LOUSMA Oct. 1992 10 p

(Contract NAGW-2901)

(NASA-CR-191217; NAS 1.26:191217) Avail: CASI HC A02/MF A01

Activities and accomplishments of the first six months of the Consortium for International Earth Science Information Network (CIESIN's) 1992 technical program have focused on four main missions: (1) the development and implementation of plans for initiation of the Socioeconomic Data and Applications Center (SEDAC) as part of the EOSDIS Program; (2) the pursuit and development of a broad-based global change information cooperative by providing systems analysis and integration between natural science and social science data bases held by numerous federal agencies and other sources; (3) the fostering of scientific research into the human dimensions of global change and providing integration between natural science and social science data and information; and (4) the serving of CIESIN as a gateway for global change data and information distribution through development of the Global Change Research Information Office and other comprehensive knowledge sharing systems.

Author

N93-12680* Consortium for International Earth Science Information Network, Ann Arbor, MI.

EARTH SCIENCE INFORMATION: PLANNING FOR THE INTEGRATION AND USE OF GLOBAL CHANGE INFORMATION Final Technical Report, 1 Apr. 1991 - 31 Mar. 1992

JACK R. LOUSMA Oct. 1992 5 p

(Contract NAGW-2010)

(NASA-CR-191208; NAS 1.26:191208) Avail: CASI HC A01/MF A01

The Consortium for International Earth Science Information Network (CIESIN) was founded in 1989 as a non-profit corporation dedicated to facilitating access to, use and understanding of global change information worldwide. The Consortium was created to cooperate and coordinate with organizations and researchers throughout the global change community to further access the most advanced technology, the latest scientific research, and the best information available for critical environmental decision making. CIESIN study efforts are guided by Congressional mandates to 'convene key present and potential users to assess the need for investment in integration of earth science information,' to 'outline the desirable pattern of interaction with the scientific and policy community,' and to 'develop recommendations and draft plans to achieve the appropriate level of effort in the use of earth science data for research and public policy purposes.' In addition, CIESIN is tasked by NASA to develop a data center that would extend the benefits of Earth Observing System (EOS) to the users of global change information related to human dimensions issues. For FY 1991, CIESIN focused on two main objectives. The first addressed the identification of information needs of global change research and non-research user groups worldwide. The second focused on an evaluation of the most efficient mechanisms for making this information available in usable forms.

Author

N93-25798* Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.

GEOGRAPHIC INFORMATION SYSTEM FOR FUSION AND ANALYSIS OF HIGH-RESOLUTION REMOTE SENSING AND GROUND TRUTH DATA Abstract Only

ANTHONY FREEMAN, JO BEA WAY, PASCALE DUBOIS, and FRANZ LEBERL (Vexcel Corp., Boulder, CO.) *In* Colorado Univ., Applied Information Systems Research Program (AISRP). Workshop 2: Meeting Proceedings 2 p 1992

Avail: CASI HC A01/MF A03

We seek to combine high-resolution remotely sensed data with models and ground truth measurements, in the context of a Geographical Information System, integrated with specialized image

processing software. We will use this integrated system to analyze the data from two Case Studies, one at a bore AI forest site, the other a tropical forest site. We will assess the information content of the different components of the data, determine the optimum data combinations to study biogeophysical changes in the forest, assess the best way to visualize the results, and validate the models for the forest response to different radar wavelengths/polarizations. During the 1990's, unprecedented amounts of high-resolution images from space of the Earth's surface will become available to the applications scientist from the LANDSAT/TM series, European and Japanese ERS-1 satellites, RADARSAT and SIR-C missions. When the Earth Observation Systems (EOS) program is operational, the amount of data available for a particular site can only increase. The interdisciplinary scientist, seeking to use data from various sensors to study his site of interest, may be faced with massive difficulties in manipulating such large data sets, assessing their information content, determining the optimum combinations of data to study a particular parameter, visualizing his results and validating his model of the surface. The techniques to deal with these problems are also needed to support the analysis of data from NASA's current program of Multi-sensor Airborne Campaigns, which will also generate large volumes of data. In the Case Studies outlined in this proposal, we will have somewhat unique data sets. For the Bonanza Creek Experimental Forest (Case I) calibrated DC-8 SAR data and extensive ground truth measurement are already at our disposal. The data set shows documented evidence to temporal change. The Belize Forest Experiment (Case II) will produce calibrated DC-8 SAR and AVIRIS data, together with extensive measurements on the tropical rain forest itself. The extreme range of these sites, one an Arctic forest, the other a tropical rain forest, has been deliberately chosen to find common problems which can lead to generalized observations and unique problems with data which raise issues for the EOS System.

Author

N93-29234*# Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA.

GEOGRAPHIC INFORMATION SYSTEM FOR FUSION AND ANALYSIS OF HIGH-RESOLUTION REMOTE SENSING AND GROUND TRUTH DATA

ANTHONY FREEMAN, PASCALE DUBOIS, FRANZ LEBERL, L. NORIKANE, and JOBEA WAY In NASA. Washington, Applied Information Systems Research Program Workshop 5 p 24 Jul. 1991

Avail: CASI HC A01

Viewgraphs on Geographic Information System for fusion and analysis of high-resolution remote sensing and ground truth data are presented. Topics covered include: scientific objectives; schedule; and Geographic Information System.

CASI

N88-24038# European Space Agency, Paris (France).

INTERNATIONAL COOPERATION IN REMOTE SENSING: THE ESA EXPERIENCE Abstract Only

VALERIE ANNE HOOD In INPE, Latin American Symposium on Remote Sensing. 4th Brazilian Remote Sensing Symposium and 6th SELPER Plenary Meeting, Volume 1 p 337 1986

Avail: CASI HC A01/MF A10

The active involvement of the European Space Agency (ESA) with remote sensing began with the establishment of the Earthnet program in 1978. Earthnet acquires data from the American remote sensing satellites (LANDSAT, SEASAT, HCCM, and Nimbus) from its stations in Fulcino, Kiruna, Oakhanger, and Maspalomas. Earthnet acquires remote sensing data and preprocesses them. Each member state of ESA has established a focal point who is responsible for remote sensing data distribution in their country. Regular meetings are held among the national points of contact and the other users of the data in the Earthnet coverage zone. The European Space Agency also participates in the LANDSAT Station Operators' Working Group. At a bilateral level ESA has many projects with the European Community including airborne campaigns, pilot projects, and training programs. Close contact in remote sensing is also kept

with Brazil, Canada, France, United States, Japan, India, and Australia on a bilateral basis. On the meteorological side, ESA has launched Meteosats 1 and 2 and will be launching Meteosat 3 this year. An extensive promotion campaign was carried out in Europe and Africa to encourage countries to use the satellite. Training programs in meteorology and agrometeorology are conducted both by ESA alone and in cooperation with other organizations. The European Space Agency is also preparing ERS-1 and is in the process of negotiating terms for direct access with several states.

Author

90

ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

N93-12380# Mitre Corp., McLean, VA.

GLOBAL CHANGE AND THE DARK OF THE MOON Final Report

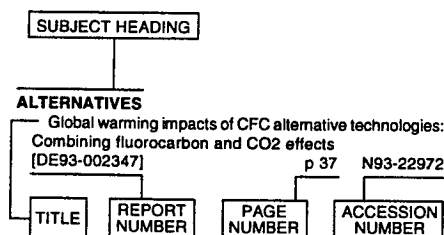
S. FLATTE, S. KOONIN, and G. MACDONALD 30 Jun. 1992 55 p

(AD-A255181; JSR-91-315; DE92-040829) Avail: CASI HC A04/MF A01

We have considered the possibility of using earthshine to measure the reflectance properties of the earth (albedo and phase function). Measurements of earthshine carried out by Danjon in 1926-33 show that even then the average albedo could be determined with a precision of ± 0.01 and that both synoptic and seasonal variations could be observed clearly. We show that, after correction for wavelength dependence and the opposition effect in the lunar reflectance properties, Danjon's visual albedo of 0.40 can be reconciled with the ERBE satellite Bond albedo of 0.30. We recommend a modern earthshine monitoring program (advantages include global integration, continuous coverage, ground basing, and low cost) as a complement to present and planned satellite measurements.

DTIC

Typical Subject Index Listing



The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of document content, a title extension is added, separated from the title by three hyphens. The accession number and the page number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence.

A

ABSTRACTS

Earth observations and global change decision making: A special bibliography, 1991
[NASA-SP-7092] p 13 N91-30588

ACCURACY

Accuracy requirements --- for monitoring of climate changes p 46 N94-21642

ACID RAIN

A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change
[DE92-019616] p 34 N93-12927

ACOUSTO-OPTICS

JPL activities on development of acousto-optic tunable filter imaging spectrometer p 5 N94-16696

ACTS

Remote Earth Sciences data collection using ACTS [NASA-CR-195227] p 18 N94-26236

AERIAL PHOTOGRAPHY

Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739
A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872

AERIAL RECONNAISSANCE

Program on stimulating operational private sector use of Earth observation satellite information
[E82-10131] p 7 N82-21660
Commercial applications multispectral sensor system p 16 N93-25615

AEROSOLS

International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 1
[DE92-013652] p 33 N93-11232
International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 2
[DE92-013653] p 33 N93-11233

Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon p 17 N94-20961
Selected translated abstracts of Russian-language climate-change publications. 2: Clouds
[DE94-011465] p 47 N94-36244

AEROSPACE SCIENCES

Research and technology, fiscal year 1983
[NASA-TM-85557] p 50 N84-20434

AEROSPACE TECHNOLOGY TRANSFER

Civil land remote sensing systems
[GPO-35-265] p 6 N82-15497

AFRICA

Global change data base training exercise manual. Exploring Earth's environment: Africa as an example
[PB92-224682] p 36 N93-21211
Global Change Data Base Pilot (Diskette) Project for Africa. Base base documentation version 1.1
[PB93-117927] p 43 N93-21686
Report of the Francophone African Workshop on the Human Dimensions of Global Change
[HDGCP-FA-001] p 41 N93-71749
Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa p 52 N94-71237

AGRICULTURE

LANDSAT Commercialization
[GPO-49-336] p 10 N86-16696
An assessment of information demands for remote sensing and Geographic Information System technologies
[PB89-159313] p 12 N89-27233
Effects of global climate change on agroecosystems: Scope of work
[PB90-120023] p 23 N90-18813
Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 1
[PB90-171588] p 24 N91-10394
Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 2
[PB90-171596] p 24 N91-10397
Climate and society in 20th century Mexico p 45 N91-27600
Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria p 15 N93-14823
Health effects of global warming: Problems in assessment
[DE93-040323] p 39 N94-19930
Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa p 52 N94-71237

AIR LAND INTERACTIONS

Biophysical characterization and surface radiation balance
[NASA-CR-194659] p 39 N94-17762
Sudden climate change: The land surface record
[NASA-CR-191691] p 41 N93-71155

AIR POLLUTION

Options for controlling the global warming impact from motor vehicles
[PB90-161688] p 23 N90-28142
TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632
The dilemma of fossil fuel use and global climate change
[DE91-007859] p 27 N91-19533
Assessing and managing the risks of climate change p 28 N92-10233
Climate and forests p 28 N92-10234
Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee
[DE92-014798] p 32 N92-31896
A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change
[DE92-019616] p 34 N93-12927

Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092
Trends '91: A compendium of data on global change. Highlights
[DE93-003112] p 38 N93-25144
Southern global change program. Determining the relationships between air pollutants, climate change, and southern forests
[PB93-176246] p 38 N93-27410
Incorporating global warming risks in power sector planning. Volume 1: A case study of the New England region
[DE93-015241] p 39 N94-17289

AIR QUALITY

Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981
Potential effects of global climate change on the United States. Appendix F: Air quality
[PB90-172230] p 25 N91-10400

AIR SAMPLING

Trends 1991: A compendium of data on global change
[DE92-011733] p 32 N92-31907

AIR SEA ICE INTERACTIONS

Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 1
[AD-A253027] p 32 N92-33578
Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 2
[AD-A253028] p 33 N92-33579
International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 1
[DE92-013652] p 33 N93-11232
International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 2
[DE92-013653] p 33 N93-11233

AIR WATER INTERACTIONS

Nelepo describes Intercosmos-Black Sea experiment p 47 N84-18257
Data sets and products p 47 N86-16856
Thermohaline circulations and global climate change
[DE91-007458] p 27 N91-19537
Thermohaline circulations and global climate change
[DE93-004601] p 36 N93-19505
Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881

AIRBORNE EQUIPMENT

Commercial applications multispectral sensor system p 16 N93-25615

AIRCRAFT

Small satellites and RPAs in global-change research, summary and conclusions
[AD-A247855] p 3 N92-27388

ALBEDO

Small satellites and RPA's in global-change research
[AD-A260762] p 38 N93-25637

ALGORITHMS

A comparative study of SAR data compression schemes p 49 N94-28259

ALIPHATIC HYDROCARBONS

Trends 1991: A compendium of data on global change
[DE92-011733] p 32 N92-31907

ALLOCATIONS

Our changing planet: The FY 1991 research plan of the US global change research program
[PB91-145813] p 28 N91-24687

ALTERNATIVES

Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO2 effects
[DE93-002347] p 37 N93-22972

AMAZON REGION (SOUTH AMERICA)

Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092

- Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite
[INPE-5444-TDI/490] p 46 N94-13614
- Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon p 17 N94-20961

ANIMALS

- Health effects of global warming: Problems in assessment
[DE93-040323] p 39 N94-19930

ANNUAL VARIATIONS

- General circulation model output for forest climate change research and applications
[PB93-124626] p 37 N93-24015

ANTENNA DESIGN

- Microwave sensing technology issues related to a global change technology architecture trade study
p 14 N92-15468

ANTHROPOLOGY

- Applications of Space-Age Technology in Anthropology
[NASA-TM-109395] p 49 N94-71223
- Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi
p 21 N94-71229
- New technology and regional studies in human ecology: A Papua New Guinea example p 42 N94-71231
- Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa
p 52 N94-71237

APPLICATIONS PROGRAMS (COMPUTERS)

- A remote sensing applications update: Results of interviews with Earth Observations Commercialization Program (EOCAP) participants p 28 N91-22623
- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

APPROPRIATIONS

- Our changing planet: The FY 1991 US global change research program. A report by the committee on Earth Sciences to accompany the FY 1991 budget
[PB90-202623] p 24 N90-28907

ARCHAEOLOGY

- Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] p 10 N86-17815
- Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi
p 21 N94-71229

ARCHITECTURE (COMPUTERS)

- Remote sensing information sciences research group: Browse in the EOS era
[NASA-CR-184637] p 11 N89-22979
- Information technology and global change science
[DE91-005020] p 26 N91-18492
- Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-109214] p 20 N94-70142

ARID LANDS

- Discrimination among semi-arid landscape endmembers using the Spectral Angle Mapper (SAM) algorithm
p 17 N94-16711

ARTIFICIAL INTELLIGENCE

- Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3
[NASA-CR-179769] p 11 N86-32863

ARTIFICIAL SATELLITES

- Geographic research in the US Geological Survey: Bibliography, 1966 - 1980
[USGS-CIRC-865] p 42 N83-11639
- Upper Atmosphere Research Satellite (UARS) trade analysis
[NASA-CR-175269] p 2 N85-15774
- Small satellites and RPA's in global-change research
[AD-A260762] p 38 N93-25837
- Assessment of satellite earth observation programs
[NASA-CR-193279] p 20 N93-72477

ASIA

- Responding to the threat of global warming: Options for the Pacific and Asia
[DE90-014756] p 24 N90-28918

ASTRONOMY

- Research contributions in astronomy, satellite remote sensing
p 10 N86-20947

ATLANTIC OCEAN

- Thermohaline circulations and global climate change
[DE93-004601] p 36 N93-19505

ATMOSPHERIC CHEMISTRY

- TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632
- The highlights of 1989
[NASA-TM-104985] p 6 N91-24669
- A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change
[DE92-019616] p 34 N93-12927
- Chemistry of the atmosphere: Its impact on global change. CHEMRAWN 7: Perspectives and recommendations
[PB93-180644] p 48 N93-29670
- Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry
[DE94-007846] p 40 N94-32817
- The Earth observing system
[NASA-TM-102942] p 20 N91-70662

ATMOSPHERIC CIRCULATION

- Sixteenth International Laser Radar Conference, part 1
[AD-A277077] p 5 N92-29228
- Radiative forcing of climate
p 33 N93-11094
- Global change research related to the Earth's energy and hydrologic cycle
[NASA-CR-195270] p 40 N94-27430

ATMOSPHERIC COMPOSITION

- Scientific linkages in global change
[PB90-112608] p 23 N90-16356
- Research programs: Meteorological prediction. Oceanic processes. Climate and global change monitoring. Satellite instrumentation and calibration p 44 N90-25447
- Solving global environmental problems through technological innovation
[DE90-010018] p 25 N91-16446
- The global climate system: Climate system monitoring, June 1986 to November 1988
[CSM-R-84/86] p 44 N91-17504
- Epilogue p 29 N92-10240
- Report of the International Ozone Trends Panel 1988, volume 2
[NASA-TM-105119] p 29 N92-15457
- Global warming. Emission reductions possible as scientific uncertainties are resolved
[GAO/RCED-90-58] p 31 N92-25415
- Sensitivity of global warming potentials to the assumed background atmosphere
[DE92-011072] p 31 N92-27417
- The role of lidars in global change research
p 31 N92-29235
- Trends 1991: A compendium of data on global change
[DE92-011733] p 32 N92-31907
- International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 1
[DE92-013652] p 33 N93-11232
- International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 2
[DE92-013653] p 33 N93-11233
- Global change research: Summaries of research in FY 1992
[DE93-002859] p 35 N93-18405
- Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO2 effects
[DE93-002347] p 37 N93-22972
- Trends '91: A compendium of data on global change. Highlights
[DE93-003112] p 38 N93-25144
- Driving terrestrial ecosystem models from space
p 39 N94-15896

ATMOSPHERIC EFFECTS

- Sixteenth International Laser Radar Conference, part 1
[AD-A277077] p 5 N92-29228

ATMOSPHERIC ELECTRICITY

- Lightning, atmospheric electricity, and climate change
[DE94-002003] p 46 N94-23471

ATMOSPHERIC GENERAL CIRCULATION MODELS

- Potential effects of global climate change on the United States. Appendix I: Variability
[PB90-173899] p 25 N91-10403
- Equilibrium-analysis of projected climate change effects on the global soil organic matter pool
[PB92-153022] p 31 N92-26509
- Thermohaline circulations and global climate change
[DE93-004601] p 36 N93-19505
- General circulation model output for forest climate change research and applications
[PB93-124626] p 37 N93-24015
- Atmospheric radiation measurement: A program for improving radiative forcing and feedback in general circulation models
[DE92-014263] p 43 N93-70092

ATMOSPHERIC HEAT BUDGET

- The Earth observing system
[NASA-TM-102942] p 20 N91-70662

ATMOSPHERIC HEATING

- The role of clouds and oceans in global greenhouse warming
[DE93-016206] p 38 N94-13079
- The Greenhouse Effect: Projections of global climate change
p 41 N88-70493
- Climate change and stratospheric ozone depletion: Need for more than the current minimalist response
p 41 N88-70502

ATMOSPHERIC MODELS

- Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981
- Modeling the response of plants and ecosystems to global change
[DE91-017403] p 28 N91-32587
- Sensitivity of climate models: Comparison of simulated and observed patterns for past climates
[DE92-002820] p 30 N92-16503
- The detection of climate change due to the enhanced greenhouse effect
[NASA-TM-107965] p 31 N92-31258
- Our changing planet: The FY 1993 US global change research program. A supplement to the US President's fiscal year 1993 budget
[NASA-CR-190675] p 32 N92-31259
- Radiative forcing of climate
p 33 N93-11094
- A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change
[DE92-019616] p 34 N93-12927
- Sensitivity of direct global warming potentials to key uncertainties
[DE92-041045] p 35 N93-16298
- NASA/MSFC FY92 Earth Science and Applications Program Research Review
[NASA-CP-3184] p 45 N93-20067
- Discrimination among semi-arid landscape endmembers using the Spectral Angle Mapper (SAM) algorithm
p 17 N94-16711
- Climate forcings and feedbacks
p 46 N94-21641
- Global change research: Summaries of research in FY 1993
[DE94-003150] p 40 N94-28473
- Role of satellite observations of sea-surface temperature in the detection of global change
[PB94-138120] p 18 N94-29107
- Acquisition of satellite remote sensing data in the Meteorological Service
p 47 N85-74434
- Toward an understanding of global change
[NASA-CR-190167] p 41 N92-70346

ATMOSPHERIC PHYSICS

- Accuracy requirements --- for monitoring of climate changes
p 46 N94-21642

ATMOSPHERIC RADIATION

- Small satellites and RPAs in global-change research, summary and conclusions
[AD-A247855] p 3 N92-27388
- Atmospheric radiation measurement: A program for improving radiative forcing and feedback in general circulation models
[DE92-014263] p 43 N93-70092

ATMOSPHERIC SCATTERING

- Global change and the dark of the moon
[AD-A255181] p 52 N93-12380

ATMOSPHERIC TEMPERATURE

- The uncertainties of global temperatures in the global warming context
[TABES PAPER 92-447] p 32 N92-32014
- Global temperature variations
p 45 N93-20068
- The role of clouds and oceans in global greenhouse warming
[DE93-016206] p 38 N94-13079
- Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite
[INPE-5444-TDI/490] p 46 N94-13614

AUTOMATIC CONTROL

- Satellite image processing using symbolic structures of reduced vision conditions
[INPE-4638-TDL/337] p 49 N89-27367

B**BACKSCATTERING**

- Sixteenth International Laser Radar Conference, part 1
[AD-A277077] p 5 N92-29228

BALTIC SEA

- The effect of global change and long period tides on the Earth's rotation and gravitational potential
p 14 N92-26781

BANDPASS FILTERS

- JPL activities on development of acousto-optic tunable filter imaging spectrometer
p 5 N94-16696

BIBLIOGRAPHIES

- Geographic research in the US Geological Survey: Bibliography, 1966 - 1980 [USGS-CIRC-865] p 42 N83-11639
- Earth observations and global change decision making: A special bibliography, 1991 [NASA-SP-7092] p 13 N91-30588
- Bibliography of global change, 1992 [NASA-SP-7102] p 15 N93-23239

BIOGEOCHEMISTRY

- International geosphere-biosphere program: A study of global change [PB88-142393] p 21 N88-19021

BIOLOGICAL EFFECTS

- Global Change: A Biogeochemical Perspective [NASA-CR-173210] p 21 N84-16656
- Global change and carrying capacity: Implications for life on Earth p 26 N91-17454
- Modeling the response of plants and ecosystems to global change [DE91-017403] p 28 N91-32587
- A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change [DE92-019616] p 34 N93-12927

BIOPHYSICS

- Driving terrestrial ecosystem models from space p 39 N94-15896
- Biophysical characterization and surface radiation balance [NASA-CR-194659] p 39 N94-17762

BIOSPHERE

- Toward an International Geosphere-Biosphere Program: A Study of Global Change [PB84-161769] p 42 N84-24038
- Hierarchy theory and global change [DE86-005154] p 44 N86-31190
- International geosphere-biosphere program: A study of global change [PB88-142393] p 21 N88-19021
- Equilibrium-analysis of projected climate change effects on the global soil organic matter pool [PB92-153022] p 31 N92-26509
- Global Climate Change (GCC) issues and their impacts on the US Army Corps of Engineers [AD-A247279] p 34 N93-11466
- Toward an understanding of global change [NASA-CR-190167] p 41 N92-70346

BOOSTER ROCKET ENGINES

- Civil space technology initiative p 1 N89-11761

BRAZILIAN SPACE PROGRAM

- Brazilian Remote Sensing Shuttle Experiment (BRESEX): Characteristics and future utilization on satellites [INPE-3313-PRE/620] p 5 N85-19385

BRIGHTNESS TEMPERATURE

- Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite [INPE-5444-TDI/490] p 46 N94-13614

BUDGETING

- Our changing planet: The FY 1992 US global change research program. A supplement to the US President's fiscal year 1992 budget p 28 N91-24690

BULGARIA

- Contribution to space program reviewed p 1 N85-26834

C

CANADIAN SPACE PROGRAM

- Conference on Using Next Generation Earth Observation Satellites: Summary handbook p 7 N83-12508

CANOPIES (VEGETATION)

- Modeling the response of plants and ecosystems to global change [DE91-017403] p 28 N91-32587
- Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite [INPE-5444-TDI/490] p 46 N94-13614

CAPACITY

- Global change and carrying capacity: Implications for life on Earth p 26 N91-17454

CARBON

- Equilibrium-analysis of projected climate change effects on the global soil organic matter pool [PB92-153022] p 31 N92-26509

CARBON COMPOUNDS

- Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon [DE93-001526] p 34 N93-16092

CARBON CYCLE

- Sensitivity of direct global warming potentials to key uncertainties [DE92-041045] p 35 N93-16298

CARBON DIOXIDE

- TRENDS '90: A compendium of data on global change [DE91-000587] p 25 N91-15632
- Modeling the response of plants and ecosystems to global change [DE91-017403] p 28 N91-32587
- Climate change: Problems of limits and policy responses p 28 N92-10232
- Climate and forests p 28 N92-10234
- Sensitivity of direct global warming potentials to key uncertainties [DE92-041045] p 35 N93-16298
- Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO2 effects [DE93-002347] p 37 N93-22972
- Incorporating global warming risks in power sector planning. Volume 1: A case study of the New England region [DE93-015241] p 39 N94-17289
- National US public policy on global warming derived from optimization of energy use and environmental impact studies [DE94-004606] p 40 N94-32790

CARBON DIOXIDE CONCENTRATION

- Carbon dioxide and climate: Summaries of research in FY 1989 [DE90-001791] p 22 N90-14723
- US energy use: New technologies and policies in response to global warming [DE90-002170] p 22 N90-14724
- A qualitative architecture for understanding policy responses to global change [DE90-003936] p 23 N90-16364
- The dilemma of fossil fuel use and global climate change [DE91-007859] p 27 N91-19533
- Thermohaline circulations and global climate change [DE91-007458] p 27 N91-19537
- Epilogue p 29 N92-10240
- Sensitivity of climate models: Comparison of simulated and observed patterns for past climates [DE92-002820] p 30 N92-16503

CEMENTS

- TRENDS '90: A compendium of data on global change [DE91-000587] p 25 N91-15632

CENTRAL PROCESSING UNITS

- Practical applications of remote sensing technology [NASA-CR-186810] p 12 N90-26377

CHANGE DETECTION

- The detection of climate change due to the enhanced greenhouse effect [NASA-TM-107965] p 31 N92-31258

CHLOROFLUOROCARBONS

- Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO2 effects [DE93-002347] p 37 N93-22972

CITIES

- Proposed methodology for the study of urban environment and space structure in metropolitan area [INPE-5203-PRE/1665] p 2 N91-21216

CLIMATE

- Toward an understanding of global change: Initial priorities for US contributions to the International Geosphere-Biosphere Program [NASA-CR-185873] p 21 N90-12980
- The global climate system: Climate system monitoring, June 1986 to November 1988 [CSM-R-84/86] p 44 N91-17504
- Modeling the response of plants and ecosystems to global change [DE91-017403] p 28 N91-32587
- Product development plans for operational satellite products for the NOAA Climate and Global Change Program: Special report no. 5 p 3 N92-16009
- Sensitivity of climate models: Comparison of simulated and observed patterns for past climates [DE92-002820] p 30 N92-16503
- Global warming. Emission reductions possible as scientific uncertainties are resolved [GAO/RCED-90-58] p 31 N92-25415
- Equilibrium-analysis of projected climate change effects on the global soil organic matter pool [PB92-153022] p 31 N92-26509
- Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee [DE92-014798] p 32 N92-31896
- The uncertainties of global temperatures in the global warming context [TABES PAPER 92-447] p 32 N92-32014

- Global Climate Change (GCC) issues and their impacts on the US Army Corps of Engineers [AD-A247279] p 34 N93-11466

- A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change [DE92-019616] p 34 N93-12927

- Global temperature variations p 45 N93-20068
- General circulation model output for forest climate change research and applications [PB93-124626] p 37 N93-24015

- Topex/Poseidon: A United States/France mission. Oceanography from space: The oceans and climate [NASA-TM-108253] p 3 N94-10699

- Climate forcings and feedbacks p 46 N94-21641
- Role of satellite observations of sea-surface temperature in the detection of global change [PB94-138120] p 18 N94-29107

- Reports to the nation on our changing planet. The climate system. Winter 1991, no. 1 p 41 N91-71392
- Reconstruction of spatial patterns of climatic anomalies during the medieval warm period (AD 900-1300) [DE94-006637] p 47 N94-72025

CLIMATE CHANGE

- Toward an understanding of global change: Initial priorities for US contributions to the International Geosphere-Biosphere Program [NASA-CR-185873] p 21 N90-12980
- Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2 [PB89-224943] p 22 N90-12981
- Climate projections with regional resolution [DE90-000858] p 22 N90-14715
- Carbon dioxide and climate: Summaries of research in FY 1989 [DE90-001791] p 22 N90-14723
- US energy use: New technologies and policies in response to global warming [DE90-002170] p 22 N90-14724
- Global climate change and NEPA (National Environmental Policy Act) analyses [DE90-003704] p 22 N90-15540
- Global climate change: A fossil energy perspective [DE90-003770] p 23 N90-15541
- Scientific linkages in global change [PB90-112608] p 23 N90-16356
- Effects of global climate change on agroecosystems: Scope of work [PB90-120023] p 23 N90-18813
- Research programs: Meteorological prediction. Oceanic processes. Climate and global change monitoring. Satellite instrumentation and calibration p 44 N90-25447
- Options for controlling the global warming impact from motor vehicles [PB90-161688] p 23 N90-28142
- Policy options for stabilizing global climate. Volume 1: Chapters 1-6 [PB90-182304] p 23 N90-28146
- Our changing planet: The FY 1991 US global change research program. A report by the committee on Earth Sciences to accompany the FY 1991 budget [PB90-202623] p 24 N90-28907
- Responding to the threat of global warming: Options for the Pacific and Asia [DE90-014756] p 24 N90-28918
- Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 1 [PB90-171588] p 24 N91-10394
- Potential effects of global climate change on the United States. Appendix A: Water resources [PB90-171968] p 24 N91-10395
- Potential effects of global climate change on the United States. Appendix B: Sea level rise [PB90-172628] p 24 N91-10396
- Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 2 [PB90-171596] p 24 N91-10397
- Potential effects of global climate change on the United States. Appendix D: Forests [PB90-173238] p 24 N91-10398
- Potential effects of global climate change on the United States. Appendix E: Aquatic resources [PB90-172297] p 25 N91-10399
- Potential effects of global climate change on the United States. Appendix F: Air quality [PB90-172230] p 25 N91-10400
- Potential effects of global climate change on the United States. Appendix G: Health [PB90-173881] p 25 N91-10401
- Potential effects of global climate change on the United States. Appendix H: Infrastructure [PB90-172313] p 25 N91-10402
- Potential effects of global climate change on the United States. Appendix I: Variability [PB90-173899] p 25 N91-10403

- Potential effects of global climate change on the United States. Appendix J. Policy [PB90-173188] p 25 N91-10404
- TRENDS '90: A compendium of data on global change [DE91-000587] p 25 N91-15632
- Solving global environmental problems through technological innovation [DE90-010018] p 25 N91-16446
- Potential responses of landscape boundaries to global environmental change [DE90-008568] p 26 N91-16451
- Global Change and Our Common Future. Papers from a Forum [LC-89-62950] p 26 N91-17453
- Global change and carrying capacity: Implications for life on Earth p 26 N91-17454
- The US global change research program: An assessment of the FY 1991 plans [LC-90-62105] p 26 N91-17457
- The global climate system: Climate system monitoring, June 1986 to November 1988 [CSM-R-84/86] p 44 N91-17504
- Information technology and global change science [DE91-005020] p 26 N91-18492
- Global change: What you can do [S-HRG-101-1160] p 26 N91-19528
- The dilemma of fossil fuel use and global climate change [DE91-007859] p 27 N91-19533
- Thermohaline circulations and global climate change [DE91-007458] p 27 N91-19537
- Statistical examination of climatological data relevant to global temperature variation [DE91-007881] p 27 N91-19540
- Global warming: Transportation and energy considerations, 1990 [PB91-118919] p 27 N91-20567
- Polar research from satellites [NASA-CR-188025] p 43 N91-21640
- Research in geosciences policy [NASA-CR-188038] p 27 N91-22619
- Global change and biodiversity loss: Some impediments to response p 27 N91-22622
- Our changing planet: The FY 1991 research plan of the US global change research program [PB91-145813] p 28 N91-24687
- Our changing planet: The FY 1992 US global change research program. A supplement to the US President's fiscal year 1992 budget p 28 N91-24690
- Satellite orbit considerations for a global change technology architecture trade study [NASA-TM-104081] p 44 N91-25557
- Science requirements for a global change technology architecture trade study [NASA-TM-104082] p 45 N91-25558
- Climate and society in 20th century Mexico p 45 N91-27600
- Climate change: Problems of limits and policy responses p 28 N92-10232
- Assessing and managing the risks of climate change p 28 N92-10233
- Climate and forests p 28 N92-10234
- Human dimensions of global change: Toward a research agenda p 29 N92-10238
- Epilogue p 29 N92-10240
- Report of the International Ozone Trends Panel 1988, volume 2 [NASA-TM-105119] p 29 N92-15457
- Global change technology architecture trade study [NASA-TM-104128] p 29 N92-15464
- Science requirements for a global change technology initiative architecture trade study p 29 N92-15465
- Satellite orbit considerations for a global change technology architecture trade study p 1 N92-15466
- Selection of representative instruments for a global change technology architecture trade study p 5 N92-15467
- Microwave sensing technology issues related to a global change technology architecture trade study p 14 N92-15468
- Geostationary orbit Earth science platform concepts for global change monitoring p 3 N92-15471
- Options in the global change fleet architecture provided by the presence of an EOS-A and -B p 3 N92-15472
- Information data systems for a global change technology initiative architecture trade study p 51 N92-15473
- Product development plans for operational satellite products for the NOAA Climate and Global Change Program: Special report no. 5 p 3 N92-16009
- Sensitivity of climate models: Comparison of simulated and observed patterns for past climates [DE92-002820] p 30 N92-16503
- Greenhouse effect: DOE's programs and activities relevant to the global warming phenomenon [GAO/RCED-90-74BR] p 30 N92-20647
- The 1991 Woodlands Conference: The Regions and Global Warming: Impacts and Response Strategies [DE92-003221] p 30 N92-24671
- Limiting net greenhouse gas emissions in the United States [DE92-007267] p 30 N92-25313
- Global warming. Emission reductions possible as scientific uncertainties are resolved [GAO/RCED-90-58] p 31 N92-25415
- Equilibrium-analysis of projected climate change effects on the global soil organic matter pool [PB92-153022] p 31 N92-26509
- Small satellites and RPAs in global-change research, summary and conclusions [AD-A247855] p 3 N92-27388
- Sensitivity of global warming potentials to the assumed background atmosphere [DE92-011072] p 31 N92-27417
- Sixteenth International Laser Radar Conference, part 1 [AD-A277077] p 5 N92-29228
- The role of lidars in global change research p 31 N92-29235
- The detection of climate change due to the enhanced greenhouse effect [NASA-TM-107965] p 31 N92-31258
- Our changing planet: The FY 1993 US global change research program. A supplement to the US President's fiscal year 1993 budget [NASA-CR-190675] p 32 N92-31259
- Our Changing Planet: The FY 1993 US Global Change Research Program. A report by the Committee on Earth and Environmental Sciences, a supplement to the US President's fiscal year 1993 budget [PB92-156892] p 32 N92-31620
- Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee [DE92-014798] p 32 N92-31896
- Trends 1991: A compendium of data on global change [DE92-011733] p 32 N92-31907
- The uncertainties of global temperatures in the global warming context [TABES PAPER 92-447] p 32 N92-32014
- Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 1 [AD-A253027] p 32 N92-33578
- Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 2 [AD-A253028] p 33 N92-33579
- Global change data sets: Excerpts from the Master Directory, version 2.0 [NASA-TM-107994] p 33 N92-34028
- Radiative forcing of climate p 33 N93-11094
- International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 1 [DE92-013652] p 33 N93-11232
- International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 2 [DE92-013653] p 33 N93-11233
- Global Climate Change (GCC) issues and their impacts on the US Army Corps of Engineers [AD-A247279] p 34 N93-11466
- Reports to the Nation on our changing planet. Winter 1991 No. 1: The climate system [NASA-CR-190954] p 45 N93-11880
- The uses and limits of economic models as a climate change policy tool [DE92-015792] p 34 N93-12474
- Earth science information: Planning for the integration and use of global change information [NASA-CR-191217] p 51 N93-12660
- A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change [DE92-019616] p 34 N93-12927
- Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon [DE93-001526] p 34 N93-16092
- Sensitivity of direct global warming potentials to key uncertainties [DE92-041045] p 35 N93-16298
- Global climate change: Some implications, opportunities, and challenges for US forestry [DE92-040874] p 35 N93-17209
- Global Change Research Program: A component of the US Global Change Research Program. 1993 research opportunities [NSF-92-77] p 35 N93-18319
- Global change research: Summaries of research in FY 1992 [DE93-002859] p 35 N93-18405
- The US global change research program: Early achievements and future directions p 36 N93-18864
- Thermohaline circulations and global climate change [DE93-004601] p 36 N93-19505
- Global change information support: A north-south coalition [NASA-TM-108983] p 36 N93-19940
- Global change data base training exercise manual. Exploring Earth's environment: Africa as an example [PB92-224682] p 36 N93-21211
- Global Change Data Base Pilot (Diskette) Project for Africa. Data base documentation version 1.1 [PB93-117927] p 43 N93-21686
- US Global Change Data and Information Management Program Plan: A report by the Committee on Earth and Environmental Sciences [PB93-101293] p 36 N93-21695
- Economics and global change: The FY 1993 research program on the economics of global change. A supplement to the US President's FY 1993 budget and a companion document to our changing planet [PB93-101244] p 37 N93-21696
- Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO2 effects [DE93-002347] p 37 N93-22972
- Bibliography of global change, 1992 [NASA-SP-7102] p 15 N93-23239
- General circulation model output for forest climate change research and applications [PB93-124626] p 37 N93-24015
- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. User's guide. Volume 1. NGDC key to geophysical records documentation No. 26 [PB93-146082] p 37 N93-24334
- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27 [PB93-146090] p 37 N93-24645
- Sea level variation p 47 N93-24929
- Analysis of LARI sensor system [DE93-006334] p 37 N93-24977
- Application of optical remote sensing to the study of surface fluxes related to cloud formation [DE93-003783] p 45 N93-25125
- Trends '91: A compendium of data on global change. Highlights [DE93-003112] p 38 N93-25144
- Southern global change program. Determining the relationships between air pollutants, climate change, and southern forests [PB93-176246] p 38 N93-27410
- Chemistry of the atmosphere: Its impact on global change. CHEMRAWN 7: Perspectives and recommendations [PB93-180644] p 48 N93-29670
- Trend survey on the elucidation of the global warming mechanism by the governments of major industrialized nations [DE93-776427] p 38 N93-29672
- Topex/Poseidon: A United States/France mission. Oceanography from space: The oceans and climate [NASA-TM-108253] p 3 N94-10699
- The role of clouds and oceans in global greenhouse warming [DE93-016206] p 38 N94-13079
- Driving terrestrial ecosystem models from space p 39 N94-15896
- EOS SAR: A new approach p 4 N94-15904
- A summary of microwave remote sensing investigations planned for BOREAS p 17 N94-15914
- Global change research: Science and policy [DE93-015675] p 39 N94-16445
- Discrimination among semi-arid landscape endmembers using the Spectral Angle Mapper (SAM) algorithm p 17 N94-16711
- Incorporating global warming risks in power sector planning. Volume 1: A case study of the New England region [DE93-015241] p 39 N94-17289
- Biophysical characterization and surface radiation balance [NASA-CR-194659] p 39 N94-17762
- Health effects of global warming: Problems in assessment [DE93-040323] p 39 N94-19930
- Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon p 17 N94-20961
- Climate forcings and feedbacks p 46 N94-21641
- Accuracy requirements --- for monitoring of climate changes p 46 N94-21642
- Lightning, atmospheric electricity, and climate change [DE94-002003] p 46 N94-23471
- Global change research related to the Earth's energy and hydrologic cycle [NASA-CR-195270] p 40 N94-27430

- Global change research: Summaries of research in FY 1993
[DE94-003150] p 40 N94-28473
Role of satellite observations of sea-surface temperature in the detection of global change
[PB94-138120] p 18 N94-29107
Global change research and NASA's Earth Observing System
[PB94-126992] p 18 N94-31068
National US public policy on global warming derived from optimization of energy use and environmental impact studies
[DE94-004606] p 40 N94-32790
Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry
[DE94-007846] p 40 N94-32817
Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881
Current policies of the major countries coping with the global warming problem and the energy demand and supply
[DE94-757291] p 40 N94-32920
Insight to global change: EOS/SAR mission
[NASA-CR-196133] p 40 N94-35503
Selected translated abstracts of Russian-language climate-change publications. 2: Clouds
[DE94-011465] p 47 N94-36244
Science priorities for the human dimensions of global change
p 40 N94-36987
The Greenhouse Effect: Projections of global climate change
p 41 N88-70493
Climate change and stratospheric ozone depletion: Need for more than the current minimalist response
p 41 N88-70502
The Earth observing system
[NASA-TM-102942] p 20 N91-70662
America's climate change strategy: An action agenda
p 41 N91-71330
Reports to the nation on our changing planet. The climate system. Winter 1991, no. 1
p 41 N91-71392
Exploring global change: The benefits and disadvantages of microsatellite, lightsatellite, and megasatellite architectures
[DE92-009513] p 41 N92-70838
Atmospheric radiation measurement: A program for improving radiative forcing and feedback in general circulation models
[DE92-014263] p 43 N93-70092
Sudden climate change: The land surface record
[NASA-CR-191691] p 41 N93-71155
Reconstruction of spatial patterns of climatic anomalies during the medieval warm period (AD 900-1300)
[DE94-006637] p 47 N94-72025
- CLIMATOLOGY**
Global climate change: A fossil energy perspective
[DE90-003770] p 23 N90-15541
Effects of global climate change on agroecosystems: Scope of work
[PB90-120023] p 23 N90-18813
Policy options for stabilizing global climate. Volume 1: Chapters 1-6
[PB90-182304] p 23 N90-28146
Our changing planet: The FY 1991 US global change research program. A report by the committee on Earth Sciences to accompany the FY 1991 budget
[PB90-202623] p 24 N90-28907
The global climate system: Climate system monitoring, June 1986 to November 1988
[CSM-R-84/86] p 44 N91-17504
Statistical examination of climatological data relevant to global temperature variation
[DE91-007881] p 27 N91-19540
Research in geosciences policy
[NASA-CR-188038] p 27 N91-22619
Global change and biodiversity loss: Some impediments to response
p 27 N91-22622
The highlights of 1989
[NASA-TM-104985] p 6 N91-24669
Our changing planet: The FY 1992 US global change research program. A supplement to the US President's fiscal year 1992 budget
p 28 N91-24690
Satellite orbit considerations for a global change technology architecture trade study
[NASA-TM-104081] p 44 N91-25557
Global change technology architecture trade study
[NASA-TM-104128] p 29 N92-15464
Satellite orbit considerations for a global change technology architecture trade study
p 1 N92-15466
Selection of representative instruments for a global change technology architecture trade study
p 5 N92-15467
- Global ecosystems database. Version 0.1 (beta-test). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Prototype 1: Database documentation. NGDC key to geophysical records documentation No. 25. User's manual
[PB92-122803] p 30 N92-21439
Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee
[DE92-014798] p 32 N92-31896
The uncertainties of global temperatures in the global warming context
[TABES PAPER 92-447] p 32 N92-32014
Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 1
[AD-A253027] p 32 N92-33578
Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 2
[AD-A253028] p 33 N92-33579
Radiative forcing of climate
p 33 N93-11094
Reports to the Nation on our changing planet. Winter 1991 No. 1: The climate system
[NASA-CR-190954] p 45 N93-11880
Global change research: Summaries of research in FY 1992
[DE93-002859] p 35 N93-18405
Thermohaline circulations and global climate change
[DE93-004601] p 36 N93-19505
General circulation model output for forest climate change research and applications
[PB93-124626] p 37 N93-24015
Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. User's guide. Volume 1. NGDC key to geophysical records documentation No. 26
[PB93-146082] p 37 N93-24334
Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645
TopeX/Poseidon: A United States/France mission. Oceanography from space: The oceans and climate
[NASA-TM-108253] p 3 N94-10699
The role of clouds and oceans in global greenhouse warming
[DE93-016206] p 38 N94-13079
Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite
[INPE-5444-TDI/490] p 46 N94-13614
Climate forcings and feedbacks
p 46 N94-21641
Accuracy requirements -- for monitoring of climate changes
p 46 N94-21642
Global change research: Summaries of research in FY 1993
[DE94-003150] p 40 N94-28473
Reports to the nation on our changing planet. The climate system. Winter 1991, no. 1
p 41 N91-71392
Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-109214] p 20 N94-70142
- CLOUD COVER**
Application of optical remote sensing to the study of surface fluxes related to cloud formation
[DE93-003783] p 45 N93-25125
The role of clouds and oceans in global greenhouse warming
[DE93-016206] p 38 N94-13079
Atmospheric radiation measurement: A program for improving radiative forcing and feedback in general circulation models
[DE92-014263] p 43 N93-70092
- CLOUDS (METEOROLOGY)**
Global Climate Change (GCC) issues and their impacts on the US Army Corps of Engineers
[AD-A247279] p 34 N93-11466
Selected translated abstracts of Russian-language climate-change publications. 2: Clouds
[DE94-011465] p 47 N94-36244
- COASTAL WATER**
Preliminary study of LANDSAT images of Taiwan and its surroundings
p 8 N84-35050
Potential effects of global climate change on the United States. Appendix B: Sea level rise
[PB90-172628] p 24 N91-10396
- COMBUSTION**
TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632
- COMBUSTION PRODUCTS**
Global climate change: A fossil energy perspective
[DE90-003770] p 23 N90-15541
- COMPUTER AIDED MAPPING**
Design and development of the terrain information extraction system
[AD-A231166] p 13 N91-21623
Scan-line methods in spatial data systems
[AD-A231165] p 50 N91-21973
The integration of remote sensing, geographic information system, and expert system technologies for landcover classification
p 49 N91-23733
Center for Mapping, Ohio State University
p 14 N92-23655
- COMPUTER GRAPHICS**
Information technology and global change science
[DE91-005020] p 26 N91-18492
Plots of ground coverage achievable by global change monitoring instruments and spacecraft
p 14 N92-15476
- COMPUTER NETWORKS**
Upper Atmosphere Research Satellite (UARS) trade analysis
[NASA-CR-175269] p 2 N85-15774
Information technology and global change science
[DE91-005020] p 26 N91-18492
Earth science information: Planning for the integration and use of global change information
[NASA-CR-191208] p 51 N93-12680
- COMPUTER PROGRAMS**
Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms
p 2 N91-28079
Modeling the response of plants and ecosystems to global change
[DE91-017403] p 28 N91-32587
- COMPUTER TECHNIQUES**
Nlelepo describes Intercosmos-Black Sea experiment
p 47 N84-18257
Analysis of LARI sensor system
[DE93-006334] p 37 N93-24977
- COMPUTER VISION**
Satellite image processing using symbolic structures of reduced vision conditions
[INPE-4638-TDL/337] p 49 N89-27367
- COMPUTERIZED SIMULATION**
Modeling the response of plants and ecosystems to global change
[DE91-017403] p 28 N91-32587
Reports to the nation on our changing planet. The climate system. Winter 1991, no. 1
p 41 N91-71392
- CONFERENCES**
Conference on Using Next Generation Earth Observation Satellites: Summary handbook
p 7 N83-12508
Toward an International Geosphere-Biosphere Program: A Study of Global Change
[PB84-161769] p 42 N84-24038
Tenth Conference of Working Group of Socialist Countries on Remote Sensing of Earth under Intercosmos Program
p 9 N85-26820
Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 1
[AD-A253027] p 32 N92-33578
Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 2
[AD-A253028] p 33 N92-33579
International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 1
[DE92-013652] p 33 N93-11232
International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 2
[DE92-013653] p 33 N93-11233
Proceedings of the First Seminar on Geographic Information Systems in Zambia
[PB92-207125] p 51 N93-11789
Highlights of the National Conference of State Legislatures: Legislative Workshop on State Uses of Satellite Remote Sensing no. 3
[NASA-CR-173790] p 19 N84-74962
Report of the Francophone African Workshop on the Human Dimensions of Global Change
[HDGCP-FA-001] p 41 N93-71749
Applications of Space-Age Technology in Anthropology
[NASA-TM-109395] p 49 N94-71223
- CONGRESSIONAL REPORTS**
Civil land remote sensing systems
[GPO-35-265] p 6 N82-15497
Civil land remote sensing system
[GPO-87-070] p 7 N82-22630
Global change: What you can do
[S-HRG-101-1160] p 26 N91-19528
Greenhouse effect: DOE's programs and activities relevant to the global warming phenomenon
[GAO/RCED-90-748R] p 30 N92-20647
Global change research and NASA's Earth Observing System
[PB94-126992] p 18 N94-31068

- Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372
- CONSERVATION**
Global change: What you can do
[S-HRG-101-1160] p 26 N91-19528
Soil conservation applications with C-band SAR
p 48 N94-16760
- CONTRACTS**
Landsat as a commercial enterprise
[INPE-5477-TAE/019] p 16 N94-11524
- CONVENTIONS**
Current policies of the major countries coping with the global warming problem and the energy demand and supply
[DE94-757291] p 40 N94-32920
- COST ANALYSIS**
A qualitative architecture for understanding policy responses to global change
[DE90-003936] p 23 N90-16364
Climate change: Problems of limits and policy responses
p 28 N92-10232
Climate and forests
p 28 N92-10234
- COST EFFECTIVENESS**
More sense for less cents: Cost effective servicing of remote sensing satellites
p 50 N94-11572
- COST ESTIMATES**
The uses and limits of economic models as a climate change policy tool
[DE92-015792] p 34 N93-12474
- COSTS**
Advanced technology needs for a global change science program: Perspective of the Langley Research Center
[NASA-TM-4196] p 12 N91-14634
- CROP GROWTH**
Climate and society in 20th century Mexico
p 45 N91-27600
- CROP INVENTORIES**
Multi-temporal satellite image analysis for crop inventories in the Po River Valley (Italy)
p 15 N93-25434
- CULTURE (SOCIAL SCIENCES)**
Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa
p 52 N94-71237

D

- DAMS**
Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria
p 15 N93-14823
- DATA ACQUISITION**
Applications of ISES for the atmospheric sciences
p 42 N90-27155
Size, duration, and rate of growth of nocturnal lightning events appearing on space shuttle video tapes
[NASA-CR-4313] p 44 N90-28310
Remote Earth Sciences data collection using ACTS
[NASA-CR-195227] p 18 N94-26236
- DATA BASES**
Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877
Design and development of the terrain information extraction system
[AD-A231166] p 13 N91-21623
Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms
p 2 N91-28079
Earth observations and global change decision making: A special bibliography, 1991
[NASA-SP-7092] p 13 N91-30588
Data policy and availability supporting global change research, development, and decision-making: An information perspective
[NASA-TM-105137] p 13 N91-30592
Global ecosystems database. Version 0.1 (beta-test). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Prototype 1: Database documentation. NGDC key to geophysical records documentation No. 25. User's manual
[PB92-122803] p 30 N92-21439
Earth science information: Planning for the integration and use of global change information
[NASA-CR-191217] p 51 N93-12660
Global change data base training exercise manual. Exploring Earth's environment: Africa as an example
[PB92-224682] p 36 N93-21211
Global Change Data Base Pilot (Diskette) Project for Africa. Data base documentation version 1.1
[PB93-117927] p 43 N93-21686

- Bibliography of global change, 1992
[NASA-SP-7102] p 15 N93-23239
Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. User's guide. Volume 1. NGDC key to geophysical records documentation No. 26
[PB93-146082] p 37 N93-24334
Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645
Exploring global change: The benefits and disadvantages of microsatellite, lightsatellite, and megasatellite architectures
[DE92-009513] p 41 N92-70838
- DATA COMPRESSION**
A comparative study of SAR data compression schemes
p 49 N94-28259
- DATA INTEGRATION**
Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645
- DATA MANAGEMENT**
Scan-line methods in spatial data systems
[AD-A231165] p 50 N91-21973
Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms
p 2 N91-28079
Data policy and availability supporting global change research, development, and decision-making: An information perspective
[NASA-TM-105137] p 13 N91-30592
Geographic information system and its applications
p 14 N92-30915
US Global Change Data and Information Management Program Plan: A report by the Committee on Earth and Environmental Sciences
[PB93-101293] p 36 N93-21695
What's past is prologue: Supporting global change research with historical data
[DE93-005777] p 38 N93-30009
Global change research related to the Earth's energy and hydrologic cycle
[NASA-CR-195270] p 40 N94-27430
Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372
Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373
Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661
Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662
Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664
- DATA PROCESSING**
Second Eastern Regional Remote Sensing Applications Conference
[E83-10189] p 7 N83-19141
Research and technology, fiscal year 1983
[NASA-TM-85557] p 50 N84-20434
Data sets and products
p 47 N86-16856
A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
[NASA-CR-179704] p 11 N86-32828
Applications of ISES for the atmospheric sciences
p 42 N90-27155
Geographic information system and its applications
p 14 N92-30915
Development of a prototype spatial information processing system for hydrologic research
[NASA-CR-191224] p 14 N92-32590
Data format standards for civilian remote sensing satellites
[PB93-192920] p 17 N94-21446
Processing and analysis evaluation of SAR-580 data and MOS-1 airborne verification data
[NASDA-CP-03-8] p 20 N90-70417
- DATA RETRIEVAL**
Geographic information system and its applications
p 14 N92-30915
- DATA STRUCTURES**
Geographic information system and its applications
p 14 N92-30915

- DATA SYSTEMS**
Analysis and modelling of spatial data proposal of a system for CBERS
[INPE-4911-PRE/1512] p 12 N90-21445
Scan-line methods in spatial data systems
[AD-A231165] p 50 N91-21973
Information data systems for a global change technology initiative architecture trade study
p 51 N92-15473
The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018
- DECISION MAKING**
A qualitative architecture for understanding policy responses to global change
[DE90-003936] p 23 N90-16364
Earth science information: Planning for the integration and use of global change information
[NASA-CR-191208] p 51 N93-12680
Science priorities for the human dimensions of global change
p 40 N94-36987
- DECOMPOSITION**
Equilibrium analysis of projected climate change effects on the global soil organic matter pool
[PB92-153022] p 31 N92-26509
- DEEP WATER**
Thermohaline circulations and global climate change
[DE93-004601] p 36 N93-19505
- DEFORESTATION**
Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092
- DENDROCHRONOLOGY**
Reconstruction of spatial patterns of climatic anomalies during the medieval warm period (AD 900-1300)
[DE94-006637] p 47 N94-72025
- DEPTH MEASUREMENT**
Preliminary study of LANDSAT imageries of Taiwan and its surroundings
p 8 N84-35050
- DETECTION**
The detection and interpretation of long-term changes in ozone from space
[NASA-TM-101135] p 21 N88-27650
- DEVELOPING NATIONS**
An assessment of information demands for remote sensing and Geographic Information System technologies
[PB89-159313] p 12 N89-27233
Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092
- DIGITAL DATA**
Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877
Development of a prototype spatial information processing system for hydrologic research
[NASA-CR-191224] p 14 N92-32590
Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739
- DIGITAL SYSTEMS**
Design and development of the terrain information extraction system
[AD-A231166] p 13 N91-21623
Scan-line methods in spatial data systems
[AD-A231165] p 50 N91-21973
- DIGITAL TECHNIQUES**
Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739
- DIRECTIONAL STABILITY**
Determining characteristics of optical radiation reflectors based on results of remote sensing
p 8 N85-25358
- DIRECTORIES**
Global change data sets: Excerpts from the Master Directory, version 2.0
[NASA-TM-107994] p 33 N92-34028
- DISEASES**
Potential effects of global climate change on the United States. Appendix G: Health
[PB90-173881] p 25 N91-10401
Health effects of global warming: Problems in assessment
[DE93-040323] p 39 N94-19930
- DISPLACEMENT**
Potential responses of landscape boundaries to global environmental change
[DE90-008568] p 26 N91-16451

SUBJECT INDEX

DMSP SATELLITES

- Assessment of satellite earth observation programs
[NASA-CR-193279] p 20 N93-72477

DOCUMENTS

- Earth observations and global change decision making:
A special bibliography, 1991
[NASA-SP-7092] p 13 N91-30588

DROUGHT

- Climate and society in 20th century Mexico
p 45 N91-27600
Health effects of global warming: Problems in
assessment
[DE93-040323] p 39 N94-19930

DUNES

- Discrimination among semi-arid landscape endmembers
using the Spectral Angle Mapper (SAM) algorithm
p 17 N94-16711

DYNAMIC CHARACTERISTICS

- Determining characteristics of optical radiation reflectors
based on results of remote sensing p 8 N85-25358

E

EARTH (PLANET)

- Global Change: A Biogeochemical Perspective
[NASA-CR-173210] p 21 N84-16656
Toward an International Geosphere-Biosphere Program:
A Study of Global Change
[PB84-161769] p 42 N84-24038
Global Change and Our Common Future. Papers from
a Forum
[LC-89-62950] p 26 N91-17453
Global change and carrying capacity: Implications for
life on Earth p 26 N91-17454
Our changing planet: The FY 1992 US global change
research program. A supplement to the US President's
fiscal year 1992 budget p 28 N91-24690
Earth observations and global change decision making:
A special bibliography, 1991
[NASA-SP-7092] p 13 N91-30588
Satellite orbit considerations for a global change
technology architecture trade study p 1 N92-15466

EARTH ALBEDO

- Global change and the dark of the moon
[AD-A255181] p 52 N93-12380

EARTH ATMOSPHERE

- The global climate system: Climate system monitoring,
June 1986 to November 1988
[CSM-R-84/86] p 44 N91-17504
The detection of climate change due to the enhanced
greenhouse effect
[NASA-TM-107965] p 31 N92-31258
Global climate change: Some implications, opportunities,
and challenges for US forestry
[DE92-040874] p 35 N93-17209
Earth sciences from space p 6 N81-76526

EARTH ENVIRONMENT

- Earth system science: A program for global change
[NASA-TM-101186] p 6 N89-22969
Need for expanded environmental measurement
capabilities in geosynchronous Earth orbit
[NASA-CR-183487] p 29 N92-14490
Our changing planet: The FY 1993 US global change
research program. A supplement to the US President's
fiscal year 1993 budget
[NASA-CR-190675] p 32 N92-31259
Global climate change: Some implications, opportunities,
and challenges for US forestry
[DE92-040874] p 35 N93-17209
Global Change Research Program: A component of the
US Global Change Research Program. 1993 research
opportunities
[NSF-92-77] p 35 N93-18319
The US global change research program: Early
achievements and future directions p 36 N93-18864
Global change data base training exercise manual.
Exploring Earth's environment: Africa as an example
[PB92-224682] p 36 N93-21211
The Human Dimensions of Global Change: An
International Programme on Human Interactions with the
Earth p 42 N93-71957

EARTH GRAVITATION

- The effect of global change and long period tides on
the Earth's rotation and gravitational potential
p 14 N92-26781

EARTH OBSERVATIONS (FROM SPACE)

- Civil land remote sensing systems
[GPO-35-265] p 6 N82-15497
Characterizing user requirements for future land
observing satellites
[NASA-TM-83867] p 6 N82-17562
Program on stimulating operational private sector use
of Earth observation satellite information
[E82-10131] p 7 N82-21660

- Civil land remote sensing system
[GPO-87-070] p 7 N82-22630
Appendix C. LANDSAT: A worldwide perspective
p 7 N83-10471
Geographic research in the US Geological Survey:
Bibliography, 1966 - 1980
[USGS-CIRC-865] p 42 N83-11639
Conference on Using Next Generation Earth
Observation Satellites: Summary handbook
p 7 N83-12508
Status and outlook for NASA's Land Remote Sensing
Program p 7 N83-17988
Naval Remote Ocean Sensing System (NROSS) study
[NASA-CR-173109] p 7 N83-35466
Spaceborne SAR and sea ice p 4 N84-16412
Technology needs of advanced Earth observation
spacecraft
[NASA-CR-3698] p 2 N84-17248
Nepelo describes Intercosmos-Black Sea experiment
p 47 N84-18257
Research and technology, fiscal year 1983
[NASA-TM-85557] p 50 N84-20434
Earth Observing System. Science and mission
requirements, volume 1, part 1
[NASA-TM-86129-VOL-1-PT-1] p 5 N84-30450
Implementation strategy p 6 N84-30453
Azerbaijan Institute develops subsatellite measurement
systems p 8 N84-31238
Analysis of lidar, radar and satellite measurements on
severe thunderstorms and their environments
p 43 N84-34864
Preliminary study of LANDSAT imagery of Taiwan and
its surroundings p 8 N84-35050
Upper Atmosphere Research Satellite (UARS) trade
analysis
[NASA-CR-175269] p 2 N85-15774
Brazilian Remote Sensing Shuttle Experiment
(BRESEX): Characteristics and future utilization on
satellites
[INPE-3313-PRE/620] p 5 N85-19385
The spot operational remote sensing satellite system:
Current status and perspectives p 8 N85-20776
The ESA remote sensing satellite system (ERS-1)
p 8 N85-20777
NASA's land remote sensing plans for the 1990's
p 8 N85-23224
Determining characteristics of optical radiation reflectors
based on results of remote sensing p 8 N85-25358
Tenth Conference of Working Group of Socialist
Countries on Remote Sensing of Earth under Intercosmos
Program p 9 N85-26820
Contribution to space program reviewed
p 1 N85-26834
Experimental philosophy leading to a small scale digital
data base of the continuous United States for designing
experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877
Process thresholds: Report of Working Group Number
3 p 9 N85-32384
Cosmonauts participate in multilevel remote sensing
experiment p 9 N85-33130
Methods for complex space experiment in USSR for
studying land from manned spacecraft
p 9 N86-14181
Role of landscape research in development of space
methods for studying Earth p 9 N86-14184
LANDSAT Commercialization
[GPO-49-336] p 10 N86-16696
Data sets and products p 47 N86-16856
Determination of the utility of remote sensing data for
land use/cover analysis in the lower Appalachia region:
Assessing the utility of remote sensing data for
archaeological site recognition
[E86-10021] p 10 N86-17815
Use of a priori evaluation of conditions for observing
Earth's surface from space for effective choice of time
for executing survey p 10 N86-20260
Research contributions in astronomy, satellite remote
sensing p 10 N86-20947
Remote sensing of the Earth from Space: A program
in crisis
[NASA-CR-176796] p 10 N86-25873
Earth observing system. Data and information system.
Volume 2A: Report of the EOS Data Panel
[NASA-TM-87777] p 6 N86-31094
Remote Sensing Information Sciences Research Group,
Santa Barbara Information Sciences Research Group, year
3
[NASA-CR-179769] p 11 N86-32863
From pattern to process: The strategy of the Earth
Observing System: Volume 2: EOS Science Steering
Committee report
[NASA-TM-89702] p 11 N88-15283
Space-based remote sensing of the Earth: A report to
the Congress
[NASA-TM-89709] p 11 N88-18046

EARTH OBSERVATIONS (FROM SPACE)

- International cooperation in remote sensing: The ESA
experience p 52 N88-24038
The detection and interpretation of long-term changes
in ozone from space p 21 N88-27650
[NASA-TM-101135]
Civil space technology initiative p 1 N89-11761
Sensors research and technology p 1 N89-11774
Study for an advanced civil earth remote sensing system.
Volume 1: Executive summary
[PB89-163257] p 12 N89-27231
Study for an advanced civil earth remote sensing system.
Volume 2: Market and financial assessment
[PB89-163265] p 12 N89-27232
Satellite image processing using symbolic structures of
reduced vision conditions
[INPE-4638-TDL/337] p 49 N89-27367
Applications of ISES for the atmospheric sciences
p 42 N90-27155
Size, duration, and rate of growth of nocturnal lightning
events appearing on space shuttle video tapes
[NASA-CR-4313] p 44 N90-28310
A remote sensing applications update: Results of
interviews with Earth Observations Commercialization
Program (EOCAP) participants p 28 N91-22623
The highlights of 1989
[NASA-TM-104985] p 6 N91-24669
Earth view: A business guide to orbital remote sensing
[NASA-CR-188238] p 13 N91-24671
Satellite orbit considerations for a global change
technology architecture trade study
[NASA-TM-104081] p 44 N91-25557
Science requirements for a global change technology
architecture trade study
[NASA-TM-104082] p 45 N91-25558
Soviet participation in FIFE-1989 remote sensing study
p 13 N91-30173
Need for expanded environmental measurement
capabilities in geosynchronous Earth orbit
[NASA-CR-183487] p 29 N92-14490
Science requirements for a global change technology
initiative architecture trade study p 29 N92-15465
Satellite orbit considerations for a global change
technology architecture trade study p 1 N92-15466
Selection of representative instruments for a global
change technology architecture trade study
p 5 N92-15467
Information data systems for a global change technology
initiative architecture trade study p 51 N92-15473
Product development plans for operational satellite
products for the NOAA Climate and Global Change
Program: Special report no. 5 p 3 N92-16009
GIS: Geographic Information Systems. State of the art
and future tendencies
[INPE-5358-NTC/301] p 51 N92-32227
Payload advisory panel recommendations
[NASA-TM-108012] p 1 N93-11528
NASA/MSFC FY92 Earth Science and Applications
Program Research Review
[NASA-CP-3184] p 45 N93-20067
Geographic information system for fusion and analysis
of high-resolution remote sensing and ground truth data
p 51 N93-25798
Landsat as a commercial enterprise
[INPE-5477-TAE/019] p 16 N94-11524
More sense for less cents: Cost effective servicing of
remote sensing satellites p 50 N94-11572
Estimations of temperature and humidity of the canopy
in Amazon Forest using microwave data from SMMR
sensor of Nimbus-7 satellite
[INPE-5444-TDI/490] p 46 N94-13614
Minutes of the Sixth CEOS Plenary Meeting
[NASA-TM-108252] p 4 N94-14112
Views from space
[NASA-TM-109634] p 16 N94-15245
X-SAR: The X-band synthetic aperture radar on board
the Space Shuttle p 4 N94-15891
JPL activities on development of acousto-optic tunable
filter imaging spectrometer p 5 N94-16696
Data format standards for civilian remote sensing
satellites
[PB93-192920] p 17 N94-21446
NASDA's view of ground control in mission operations
p 4 N94-23835
Mission planning for an Earth observation low Earth
orbiter: ERS-1 p 50 N94-23868
The potential for the Department of Defense to use
space-based remote sensing to support DOD and other
government agencies' environmental programs
[AD-A273895] p 18 N94-25656
Remote Earth Sciences data collection using ACTS
[NASA-CR-195227] p 18 N94-26236
Global change research related to the Earth's energy
and hydrologic cycle
[NASA-CR-195270] p 40 N94-27430
A comparative study of SAR data compression
schemes p 49 N94-28259

- A collection of The Movies
[NASA-TM-109806] p 19 N94-33598
- The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018
- Earth sciences from space p 6 N81-76526
- Space imagery processing: Methods and applications at the I.G.N.-France p 19 N83-70161
- Utilisation of Spacelab for remote sensing of Earth resources p 19 N84-74448
- Highlights of the National Conference of State Legislatures: Legislative Workshop on State Uses of Satellite Remote Sensing no. 3
[NASA-CR-173790] p 19 N84-74962
- Space Shuttle radar (SIR-A) views near-East volcanoes p 43 N85-73230
- Program on Earth Observation Data Management Systems (EODMS) p 19 N85-73372
- Program on Earth Observation Data Management Systems (EODMS) p 19 N85-73373
- Program on Earth Observation Data Management Systems (EODMS): Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661
- Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662
- Program on Earth Observation Data Management Systems (EODMS): Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664
- Acquisition of satellite remote sensing data in the Meteorological Service p 47 N85-74434
- A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872
- Processing and analysis evaluation of SAR-580 data and MOS-1 airborne verification data
[NASA-CP-03-B] p 20 N90-70417
- Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-101849] p 20 N90-70833
- Assessment of satellite earth observation programs
[NASA-CR-193279] p 20 N93-72477
- Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-109214] p 20 N94-70142
- EARTH OBSERVING SYSTEM (EOS)**
- Earth Observing System. Science and mission requirements, volume 1, part 1
[NASA-TM-86129-VOL-1-PT-1] p 5 N84-30450
- Earth observing system. Data and information system. Volume 2A: Report of the EOS Data Panel
[NASA-TM-87777] p 6 N86-31094
- From pattern to process: The strategy of the Earth Observing System: Volume 2: EOS Science Steering Committee report
[NASA-TM-89702] p 11 N88-15283
- Remote sensing information sciences research group
[NASA-CR-183374] p 11 N89-14481
- Remote sensing information sciences research group: Browse in the EOS era
[NASA-CR-184637] p 11 N89-22979
- The US global change research program: An assessment of the FY 1991 plans
[LC-90-62105] p 26 N91-17457
- A remote sensing applications update: Results of interviews with Earth Observations Commercialization Program (EOCAP) participants p 28 N91-22623
- Potential commercial uses of EOS remote sensing products p 13 N91-24055
- The highlights of 1989
[NASA-TM-104985] p 6 N91-24669
- Options in the global change fleet architecture provided by the presence of an EOS-A and -B p 3 N92-15472
- Global change technology initiative architecture trade study plan p 29 N92-15474
- Payload advisory panel recommendations
[NASA-TM-108012] p 1 N93-11528
- Earth science information: Planning for the integration and use of global change information
[NASA-CR-191208] p 51 N93-12680
- * Minutes of the Sixth CEOS Plenary Meeting
[NASA-TM-108252] p 4 N94-14112
- EOS SAR: A new approach p 4 N94-15904
- Global change research and NASA's Earth Observing System
[PB94-126992] p 18 N94-31068
- The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018
- Insight to global change: EOS/SAR mission
[NASA-CR-196133] p 40 N94-35503
- The Earth observing system
[NASA-TM-102942] p 20 N91-70662
- Assessment of satellite earth observation programs
[NASA-CR-193279] p 20 N93-72477
- EARTH ORBITS**
- Global change technology architecture trade study
[NASA-TM-104128] p 29 N92-15464
- Sunsynchronous low Earth orbit spacecraft concepts and technology requirements for global change monitoring p 2 N92-15469
- Hoop column soil moisture spacecraft in low Earth orbit for global change monitoring p 3 N92-15470
- EARTH RADIATION BUDGET**
- Biophysical characterization and surface radiation balance
[NASA-CR-194659] p 39 N94-17762
- Climate forcings and feedbacks p 46 N94-21641
- The Earth observing system
[NASA-TM-102942] p 20 N91-70662
- Reports to the nation on our changing planet. The climate system. Winter 1991, no. 1 p 41 N91-71392
- EARTH RADIATION BUDGET EXPERIMENT**
- Global change and the dark of the moon
[AD-A255181] p 52 N93-12380
- EARTH RESOURCES**
- Geographic research in the US Geological Survey: Bibliography, 1966 - 1980
[USGS-CIRC-865] p 42 N83-11639
- Earth Observing System. Science and mission requirements, volume 1, part 1
[NASA-TM-86129-VOL-1-PT-1] p 5 N84-30450
- Azerbaijan Institute develops subsatellite measurement systems p 8 N84-31238
- Cosmonauts participate in multilevel remote sensing experiment p 9 N85-33130
- Role of landscape research in development of space methods for studying Earth
[LANDSAT Commercialization] p 9 N86-14184
- [GPO-49-336] p 10 N86-16696
- Earth observing system. Data and information system. Volume 2A: Report of the EOS Data Panel
[NASA-TM-87777] p 6 N86-31094
- Global change and carrying capacity: Implications for life on Earth p 26 N91-17454
- A remote sensing applications update: Results of interviews with Earth Observations Commercialization Program (EOCAP) participants p 28 N91-22623
- What's past is prologue: Supporting global change research with historical data
[DE93-005777] p 38 N93-30009
- Minutes of the Sixth CEOS Plenary Meeting
[NASA-TM-108252] p 4 N94-14112
- Mapping Tomorrow's Resources: A symposium on the uses of remote sensing, Geographic Information Systems (GIS), and Global Positioning Systems (GPS) for natural resources management p 17 N94-24357
- Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-109214] p 20 N94-70142
- EARTH RESOURCES INFORMATION SYSTEM**
- Civil land remote sensing systems
[GPO-35-265] p 6 N82-15497
- EARTH SCIENCES**
- Our changing planet: The FY 1991 US global change research program. A report by the committee on Earth Sciences to accompany the FY 1991 budget
[PB90-202623] p 24 N90-28907
- Geostationary orbit Earth science platform concepts for global change monitoring p 3 N92-15471
- The role of lidars in global change research p 31 N92-29235
- Global change data sets: Excerpts from the Master Directory, version 2.0
[NASA-TM-107994] p 33 N92-34028
- Payload advisory panel recommendations
[NASA-TM-108012] p 1 N93-11528
- Earth science information: Planning for the integration and use of global change information
[NASA-CR-191217] p 51 N93-12660
- Earth science information: Planning for the integration and use of global change information
[NASA-CR-191208] p 51 N93-12680
- The US global change research program: Early achievements and future directions p 36 N93-18864
- NASA/MSFC FY92 Earth Science and Applications Program Research Review
[NASA-CP-3184] p 45 N93-20067
- US Global Change Data and Information Management Program Plan: A report by the Committee on Earth and Environmental Sciences
[PB93-101293] p 36 N93-21695
- Earth sciences from space p 6 N81-76526
- The Human Dimensions of Global Change: An International Programme on Human Interactions with the Earth p 42 N93-71957
- EARTH SURFACE**
- Use of a priori evaluation of conditions for observing Earth's surface from space for effective choice of time for executing survey p 10 N86-20260
- Science requirements for a global change technology architecture trade study
[NASA-TM-104082] p 45 N91-25558
- Soviet participation in FIFE-1989 remote sensing study p 13 N91-30173
- Science requirements for a global change technology initiative architecture trade study p 29 N92-15465
- Lightning, atmospheric electricity, and climate change
[DE94-002003] p 46 N94-23471
- Sudden climate change: The land surface record
[NASA-CR-191691] p 41 N93-71155
- EARTHNET**
- International cooperation in remote sensing: The ESA experience p 52 N88-24038
- ECOLOGY**
- Hierarchy theory and global change
[DE86-005154] p 44 N86-31190
- Global change in the geosphere-biosphere: Priorities for an IGBP (International Geosphere-Biosphere Program)
[DE87-005034] p 21 N87-22313
- Potential effects of global climate change on the United States. Appendix E: Aquatic resources
[PB90-172297] p 25 N91-10399
- Minutes of the Sixth CEOS Plenary Meeting
[NASA-TM-108252] p 4 N94-14112
- Driving terrestrial ecosystem models from space p 39 N94-15896
- New technology and regional studies in human ecology: A Papua New Guinea example p 42 N94-71231
- ECONOMIC ANALYSIS**
- Study for an advanced civil earth remote sensing system. Volume 1: Executive summary
[PB89-163257] p 12 N89-27231
- Study for an advanced civil earth remote sensing system. Volume 2: Market and financial assessment
[PB89-163265] p 12 N89-27232
- Climate and forests p 28 N92-10234
- The uses and limits of economic models as a climate change policy tool
[DE92-015792] p 34 N93-12474
- Earth science information: Planning for the integration and use of global change information
[NASA-CR-191217] p 51 N93-12660
- Economics and global change: The FY 1993 research program on the economics of global change. A supplement to the US President's FY 1993 budget and a companion document to our changing planet
[PB93-101244] p 37 N93-21696
- ECONOMIC FACTORS**
- Economics and global change: The FY 1993 research program on the economics of global change. A supplement to the US President's FY 1993 budget and a companion document to our changing planet
[PB93-101244] p 37 N93-21696
- Landsat as a commercial enterprise
[INPE-5477-TAE/O19] p 16 N94-11524
- ECONOMIC IMPACT**
- The uses and limits of economic models as a climate change policy tool
[DE92-015792] p 34 N93-12474
- ECONOMICS**
- Global Change and Our Common Future. Papers from a Forum
[LC-89-62950] p 26 N91-17453
- Economics and global change: The FY 1993 research program on the economics of global change. A supplement to the US President's FY 1993 budget and a companion document to our changing planet
[PB93-101244] p 37 N93-21696
- ECOSYSTEMS**
- Effects of global climate change on agroecosystems: Scope of work
[PB90-120023] p 23 N90-18813
- Potential responses of landscape boundaries to global environmental change
[DE90-008568] p 26 N91-16451
- Modeling the response of plants and ecosystems to global change
[DE91-017403] p 28 N91-32587
- GLOBEC: Global Ocean Ecosystems Dynamics: A component of the US Global Change Research Program
[NASA-TM-105121] p 47 N92-11603

- Global ecosystems database. Version 0.1 (beta-test). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Prototype 1: Database documentation. NGDC key to geophysical records documentation No. 25. User's manual [PB92-122803] p 30 N92-21439
- Equilibrium-analysis of projected climate change effects on the global soil organic matter pool [PB92-153022] p 31 N92-26509
- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. User's guide. Volume 1. NGDC key to geophysical records documentation No. 26 [PB93-146082] p 37 N93-24334
- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27 [PB93-146090] p 37 N93-24645
- Southern global change program. Determining the relationships between air pollutants, climate change, and southern forests [PB93-176246] p 38 N93-27410
- Driving terrestrial ecosystem models from space p 39 N94-15896
- Discrimination among semi-arid landscape endmembers using the Spectral Angle Mapper (SAM) algorithm p 17 N94-16711
- Toward an understanding of global change [NASA-CR-190167] p 41 N92-70346
- EDUCATION**
- Global change data base training exercise manual. Exploring Earth's environment: Africa as an example [PB92-224682] p 36 N93-21211
- ENERGY CONSERVATION**
- US energy use: New technologies and policies in response to global warming [DE90-002170] p 22 N90-14724
- Climate change and stratospheric ozone depletion: Need for more than the current minimalist response p 41 N88-70502
- ENERGY POLICY**
- A qualitative architecture for understanding policy responses to global change [DE90-003936] p 23 N90-16364
- Responding to the threat of global warming: Options for the Pacific and Asia [DE90-014756] p 24 N90-28918
- Climate change: Problems of limits and policy responses p 28 N92-10232
- Greenhouse effect: DOE's programs and activities relevant to the global warming phenomenon [GAO/RCED-90-74BR] p 30 N92-20647
- The 1991 Woodlands Conference: The Regions and Global Warming: Impacts and Response Strategies [DE92-003221] p 30 N92-24671
- Limiting net greenhouse gas emissions in the United States [DE92-007267] p 30 N92-25313
- The uses and limits of economic models as a climate change policy tool [DE92-015792] p 34 N93-12474
- Global change research: Summaries of research in FY 1992 [DE93-002859] p 35 N93-18405
- Current policies of the major countries coping with the global warming problem and-the energy demand and supply [DE94-757291] p 40 N94-32920
- America's climate change strategy: An action agenda p 41 N91-71330
- ENVIRONMENT EFFECTS**
- Global change in the geosphere-biosphere: Initial priorities for an IGBP [NASA-CR-176519] p 42 N86-20992
- A qualitative architecture for understanding policy responses to global change [DE90-003936] p 23 N90-16364
- Effects of global climate change on agroecosystems: Scope of work [PB90-120023] p 23 N90-18813
- Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 1 [PB90-171588] p 24 N91-10394
- Potential effects of global climate change on the United States. Appendix A: Water resources [PB90-171968] p 24 N91-10395
- Potential effects of global climate change on the United States. Appendix B: Sea level rise [PB90-172628] p 24 N91-10396
- Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 2 [PB90-171596] p 24 N91-10397
- Potential effects of global climate change on the United States. Appendix D: Forests [PB90-173238] p 24 N91-10398
- Potential effects of global climate change on the United States. Appendix E: Aquatic resources [PB90-172297] p 25 N91-10399
- Potential effects of global climate change on the United States. Appendix F: Air quality [PB90-172230] p 25 N91-10400
- Potential effects of global climate change on the United States. Appendix H: Infrastructure [PB90-172313] p 25 N91-10402
- Potential effects of global climate change on the United States. Appendix I: Variability [PB90-173899] p 25 N91-10403
- Potential effects of global climate change on the United States. Appendix J: Policy [PB90-173188] p 25 N91-10404
- Potential responses of landscape boundaries to global environmental change [DE90-008568] p 26 N91-16451
- Research in geosciences policy [NASA-CR-188038] p 27 N91-22619
- Global change and biodiversity loss: Some impediments to response p 27 N91-22622
- Epilogue p 29 N92-10240
- The 1991 Woodlands Conference: The Regions and Global Warming: Impacts and Response Strategies [DE92-003221] p 30 N92-24671
- Global change data sets: Excerpts from the Master Directory, version 2.0 [NASA-TM-107994] p 33 N92-34028
- Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon [DE93-001526] p 34 N93-16092
- Southern global change program. Determining the relationships between air pollutants, climate change, and southern forests [PB93-176246] p 38 N93-27410
- Incorporating global warming risks in power sector planning. Volume 1: A case study of the New England region [DE93-015241] p 39 N94-17289
- Health effects of global warming: Problems in assessment [DE93-040323] p 39 N94-19930
- Global change research: Summaries of research in FY 1993 [DE94-003150] p 40 N94-28473
- Science priorities for the human dimensions of global change p 40 N94-36987
- Toward an understanding of global change [NASA-CR-190167] p 41 N92-70346
- ENVIRONMENT MANAGEMENT**
- Global climate change and NEPA (National Environmental Policy Act) analyses [DE90-003704] p 22 N90-15540
- Assessing and managing the risks of climate change p 28 N92-10233
- Human dimensions of global change: Toward a research agenda p 29 N92-10238
- Payload advisory panel recommendations [NASA-TM-108012] p 1 N93-11528
- Global change research: Science and policy [DE93-015675] p 39 N94-16445
- The potential for the Department of Defense to use space-based remote sensing to support DOD and other government agencies' environmental programs [AD-A273895] p 18 N94-25656
- Science priorities for the human dimensions of global change p 40 N94-36987
- ENVIRONMENT MODELS**
- The uses and limits of economic models as a climate change policy tool [DE92-015792] p 34 N93-12474
- Driving terrestrial ecosystem models from space p 39 N94-15896
- ENVIRONMENT POLLUTION**
- Solving global environmental problems through technological innovation [DE90-010018] p 25 N91-16446
- Global change: What you can do [S-HRG-101-1160] p 26 N91-19528
- ENVIRONMENT PROTECTION**
- Global Change and Our Common Future. Papers from a Forum [LC-89-62950] p 26 N91-17453
- Research in geosciences policy [NASA-CR-188038] p 27 N91-22619
- Climate change: Problems of limits and policy responses p 28 N92-10232
- Our Changing Planet: The FY 1993 US Global Change Research Program. A report by the Committee on Earth and Environmental Sciences, a supplement to the US President's fiscal year 1993 budget [PB92-156892] p 32 N92-31620
- Payload advisory panel recommendations [NASA-TM-108012] p 1 N93-11528
- Global Change Research Program: A component of the US Global Change Research Program. 1993 research opportunities [NSF-92-77] p 35 N93-18319
- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27 [PB93-146090] p 37 N93-24645
- Multisensor remote sensing data and GIS techniques for monitoring preservation areas: A case study [INPE-5317-PRE/1714] p 16 N94-14131
- Current policies of the major countries coping with the global warming problem and-the energy demand and supply [DE94-757291] p 40 N94-32920
- Science priorities for the human dimensions of global change p 40 N94-36987
- America's climate change strategy: An action agenda p 41 N91-71330
- ENVIRONMENTAL ENGINEERING**
- Research on enhancing the utilization of digital multispectral data and geographic information systems in global habitability studies [NASA-CR-177294] p 10 N86-26669
- Trends '91: A compendium of data on global change. Highlights [DE93-003112] p 38 N93-25144
- ENVIRONMENTAL MONITORING**
- Global climate change and NEPA (National Environmental Policy Act) analyses [DE90-003704] p 22 N90-15540
- Research programs: Meteorological prediction. Oceanic processes. Climate and global change monitoring. Satellite instrumentation and calibration p 44 N90-25447
- Need for expanded environmental measurement capabilities in geosynchronous Earth orbit [NASA-CR-183487] p 29 N92-14490
- Report of the International Ozone Trends Panel 1988, volume 2 [NASA-TM-105119] p 29 N92-15457
- Geostationary orbit Earth science platform concepts for global change monitoring p 3 N92-15471
- Information data systems for a global change technology initiative architecture trade study p 51 N92-15473
- Product development plans for operational satellite products for the NOAA Climate and Global Change Program: Special report no. 5 p 3 N92-16009
- Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee [DE92-014798] p 32 N92-31896
- Commercial applications multispectral sensor system p 16 N93-25615
- What's past is prologue: Supporting global change research with historical data [DE93-005777] p 38 N93-30009
- Minutes of the Sixth CEOS Plenary Meeting [NASA-TM-108252] p 4 N94-14112
- Views from space [NASA-TM-109634] p 16 N94-15245
- A summary of microwave remote sensing investigations planned for BOREAS p 17 N94-15914
- Global change research: Science and policy [DE93-015675] p 39 N94-16445
- Soil conservation applications with C-band SAR p 48 N94-16760
- Climate forcings and feedbacks p 46 N94-21641
- Accuracy requirements --- for monitoring of climate changes p 46 N94-21642
- Lightning, atmospheric electricity, and climate change [DE94-002003] p 46 N94-23471
- Global change research and NASA's Earth Observing System [PB94-126992] p 18 N94-31068
- Ocean variability and its influence on the detectability of greenhouse warming signals [DE94-008670] p 48 N94-32881
- Climate change and stratospheric ozone depletion: Need for more than the current minimalist response p 41 N88-70502
- ENVIRONMENTAL QUALITY**
- Global change: What you can do [S-HRG-101-1160] p 26 N91-19528
- Our changing planet: The FY 1993 US global change research program. A supplement to the US President's fiscal year 1993 budget [NASA-CR-190675] p 32 N92-31259

ENVIRONMENTAL SURVEYS

- Trend survey on the elucidation of the global warming mechanism by the governments of major industrialized nations
[DE93-776427] p 38 N93-29672
- ENVIRONMENTAL SURVEYS**
Global climate change and NEPA (National Environmental Policy Act) analyses
[DE90-003704] p 22 N90-15540
National US public policy on global warming derived from optimization of energy use and environmental impact studies
[DE94-004606] p 40 N94-32790
Report of the Francophone African Workshop on the Human Dimensions of Global Change
[HDCGP-FA-001] p 41 N93-71749
Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa
p 52 N94-71237
- ENVIRONMENTS**
LANDSAT Commercialization
[GPO-49-336] p 10 N86-16696
Global change in the geosphere-biosphere: Priorities for an IGBP (International Geosphere-Biosphere Program)
[DE87-005034] p 21 N87-22313
- EQUIPMENT SPECIFICATIONS**
Physical and performance characteristics of instruments selected for global change monitoring p 5 N92-15475
- ERRORS**
A comparative study of SAR data compression schemes p 49 N94-28259
- ERS-1 (ESA SATELLITE)**
The ESA remote sensing satellite system (ERS-1)
p 8 N85-20777
Mission planning for an Earth observation low Earth orbiter: ERS-1 p 50 N94-23868
- EUROPEAN SPACE AGENCY**
International cooperation in remote sensing: The ESA experience p 52 N88-24038
- EUROPEAN SPACE PROGRAMS**
International cooperation in remote sensing: The ESA experience p 52 N88-24038
- EVALUATION**
Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373
- EXHAUST EMISSION**
Options for controlling the global warming impact from motor vehicles
[PB90-161688] p 23 N90-28142
Limiting net greenhouse gas emissions in the United States
[DE92-007267] p 30 N92-25313
- EXHAUST GASES**
A qualitative architecture for understanding policy responses to global change
[DE90-003936] p 23 N90-16364
Limiting net greenhouse gas emissions in the United States
[DE92-007267] p 30 N92-25313
- EXPERT SYSTEMS**
Remote sensing information sciences research group
[NASA-CR-183374] p 11 N89-14481
The integration of remote sensing, geographic information system, and expert system technologies for landcover classification p 49 N91-23733
- EXTINCTION**
Global change and biodiversity loss: Some impediments to response p 27 N91-22622

F

- FARM CROPS**
Multi-temporal satellite image analysis for crop inventories in the Po River Valley (Italy)
p 15 N93-25434
- FARMLANDS**
NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438
- FEASIBILITY ANALYSIS**
NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438
- FEDERAL BUDGETS**
Our changing planet: The FY 1991 research plan of the US global change research program
[PB91-145813] p 28 N91-24687
Our changing planet: The FY 1993 US global change research program. A supplement to the US President's fiscal year 1993 budget
[NASA-CR-190675] p 32 N92-31259
Economics and global change: The FY 1993 research program on the economics of global change. A supplement to the US President's FY 1993 budget and a companion document to our changing planet
[PB93-101244] p 37 N93-21696

FEEDBACK

- Accuracy requirements --- for monitoring of climate changes p 46 N94-21642

FINANCIAL MANAGEMENT

- Our changing planet: The FY 1991 research plan of the US global change research program
[PB91-145813] p 28 N91-24687

FISHERIES

- Remote sensing and geographic information systems: Implications for Global Marine Fisheries
[PB93-149409] p 15 N93-24309

FISHING

- Remote sensing and geographic information systems: Implications for Global Marine Fisheries
[PB93-149409] p 15 N93-24309

FLOOD PLAINS

- Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria p 15 N93-14823

FORECASTING

- Climate projections with regional resolution
[DE90-000858] p 22 N90-14715

FOREST FIRE DETECTION

- Multisensor remote sensing data and GIS techniques for monitoring preservation areas: A case study
[INPE-5317-PRE/1714] p 16 N94-14131

FOREST MANAGEMENT

- A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
[NASA-CR-179704] p 11 N86-32828
Climate and forests p 28 N92-10234
Global climate change: Some implications, opportunities, and challenges for US forestry
[DE92-040874] p 35 N93-17209

FORESTS

- A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
[NASA-CR-179704] p 11 N86-32828
Potential effects of global climate change on the United States. Appendix D: Forests
[PB90-173238] p 24 N91-10398
Climate and forests p 28 N92-10234
General circulation model output for forest climate change research and applications
[PB93-124626] p 37 N93-24015
Southern global change program. Determining the relationships between air pollutants, climate change, and southern forests
[PB93-176246] p 38 N93-27410
A summary of microwave remote sensing investigations planned for BOREAS p 17 N94-15914

FORMAT

- Data format standards for civilian remote sensing satellites
[PB93-192920] p 17 N94-21446

FOSSIL FUELS

- Global climate change: A fossil energy perspective
[DE90-003770] p 23 N90-15541
TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632
Solving global environmental problems through technological innovation
[DE90-010018] p 25 N91-16446
The dilemma of fossil fuel use and global climate change
[DE91-007859] p 27 N91-19533
National US public policy on global warming derived from optimization of energy use and environmental impact studies
[DE94-004606] p 40 N94-32790

FRACTALS

- Detecting the scale and resolution effects in remote sensing and GIS p 16 N93-25707

FUEL CONSUMPTION

- National US public policy on global warming derived from optimization of energy use and environmental impact studies
[DE94-004606] p 40 N94-32790

FUELS

- A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
[NASA-CR-179704] p 11 N86-32828

G

GAS EXCHANGE

- Driving terrestrial ecosystem models from space p 39 N94-15896

GEOBOTANY

- NASA's land remote sensing plans for the 1980's p 8 N85-23224

GEOCENTRIC COORDINATES

- Plots of ground coverage achievable by global change monitoring instruments and spacecraft p 14 N92-15476

GEOCHEMISTRY

- Global Change: A Biogeochemical Perspective
[NASA-CR-173210] p 21 N84-16656

GEOCHRONOLOGY

- Reconstruction of spatial patterns of climatic anomalies during the medieval warm period (AD 900-1300)
[DE94-006637] p 47 N94-72025

GEODETTIC SURVEYS

- Remote sensing and the Mississippi high accuracy reference network p 19 N94-32466

GEOGRAPHIC INFORMATION SYSTEMS

- Second Eastern Regional Remote Sensing Applications Conference
[E83-10189] p 7 N83-19141
APPS-4 (Analytical Photogrammetric Processing System-4) remote sensing applications guide
[AD-A134977] p 8 N84-17676
Remote sensing training for Corps of Engineering personnel: The university training module concept
[NASA-CR-175204] p 48 N84-20154
Research on enhancing the utilization of digital multispectral data and geographic information systems in global habitability studies
[NASA-CR-177294] p 10 N86-26669
Research, investigations and technical developments: National mapping program, 1983-1984
[PB86-166097] p 11 N86-26675
A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
[NASA-CR-179704] p 11 N86-32828
Remote sensing information sciences research group
[NASA-CR-183374] p 11 N89-14481
Remote sensing information sciences research group: Browse in the EOS era
[NASA-CR-184637] p 11 N89-22979
An assessment of information demands for remote sensing and Geographic Information System technologies
[PB89-159313] p 12 N89-27233
Analysis and modelling of spatial data proposal of a system for CBERS
[INPE-4911-PRE/1512] p 12 N90-21445
Practical applications of remote sensing technology
[NASA-CR-186810] p 12 N90-26377
NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438
Proposed methodology for the study of urban environment and space structure in metropolitan area
[INPE-5203-PRE/1665] p 2 N91-21216
Design and development of the terrain information extraction system
[AD-A231166] p 13 N91-21623
Scan-line methods in spatial data systems
[AD-A231165] p 50 N91-21973
The integration of remote sensing, geographic information system, and expert system technologies for landcover classification p 49 N91-23733
Potential commercial uses of EOS remote sensing products p 13 N91-24055
Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms p 2 N91-28079
Global ecosystems database. Version 0.1 (beta-test). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Prototype 1: Database documentation. NGDC key to geophysical records documentation No. 25. User's manual
[PB92-122803] p 30 N92-21439
Center for Mapping, Ohio State University p 14 N92-23655
Geographic information system and its applications p 14 N92-30915
GIS: Geographic Information Systems. State of the art and future tendencies
[INPE-5358-NTC/301] p 51 N92-32227
Development of a prototype spatial information processing system for hydrologic research
[NASA-CR-191224] p 14 N92-32590
Proceedings of the First Seminar on Geographic Information Systems in Zambia
[PB92-207125] p 51 N93-11789
Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria p 15 N93-14823
Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739

- Global change data base training exercise manual. Exploring Earth's environment: Africa as an example [PB92-224682] p 36 N93-21211
- Remote sensing and geographic information systems: Implications for Global Marine Fisheries [PB93-149409] p 15 N93-24309
- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. User's guide. Volume 1. NGDC key to geophysical records documentation No. 26 [PB93-146082] p 37 N93-24334
- Multi-temporal satellite image analysis for crop inventories in the Po River Valley (Italy) p 15 N93-25434
- Commercial applications multispectral sensor system p 16 N93-25615
- Detecting the scale and resolution effects in remote sensing and GIS p 16 N93-25707
- Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 51 N93-25798
- Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 52 N93-29234
- Multisensor remote sensing data and GIS techniques for monitoring preservation areas: A case study [INPE-5317-PRE/1714] p 16 N94-14131
- Soil conservation applications with C-band SAR p 48 N94-16760
- Mapping Tomorrow's Resources: A symposium on the uses of remote sensing, Geographic Information Systems (GIS), and Global Positioning Systems (GPS) for natural resources management p 17 N94-24357
- Remote sensing for urban planning p 18 N94-32465
- Remote sensing and the Mississippi high accuracy reference network p 19 N94-32466
- Applications of Space-Age Technology in Anthropology [NASA-TM-109395] p 49 N94-71223
- Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi p 21 N94-71229
- New technology and regional studies in human ecology: A Papua New Guinea example p 42 N94-71231
- Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa p 52 N94-71237
- GEOGRAPHY**
- Geographic research in the US Geological Survey: Bibliography, 1966 - 1980 [USGS-CIRC-865] p 42 N83-11639
- Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms p 2 N91-28079
- What's past is prologue: Supporting global change research with historical data [DE93-005777] p 38 N93-30009
- GEOLOGICAL SURVEYS**
- NASA's land remote sensing plans for the 1980's p 8 N85-23224
- GEOMORPHOLOGY**
- Process thresholds: Report of Working Group Number 3 p 9 N85-32384
- GEOPHYSICS**
- Tenth Conference of Working Group of Socialist Countries on Remote Sensing of Earth under Intercosmos Program p 9 N85-26820
- Research in geosciences policy [NASA-CR-188038] p 27 N91-22619
- Global ecosystems database. Version 0.1 (beta-test). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Prototype 1: Database documentation. NGDC key to geophysical records documentation No. 25. User's manual [PB92-122803] p 30 N92-21439
- NASA/MSFC FY92 Earth Science and Applications Program Research Review [NASA-CP-3184] p 45 N93-20067
- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. User's guide. Volume 1. NGDC key to geophysical records documentation No. 26 [PB93-146082] p 37 N93-24334
- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27 [PB93-146090] p 37 N93-24645
- EOS SAR: A new approach p 4 N94-15904
- Global change research related to the Earth's energy and hydrologic cycle [NASA-CR-195270] p 40 N94-27430
- GEOSAT SATELLITES**
- Assessment of satellite earth observation programs [NASA-CR-193279] p 20 N93-72477
- GLACIERS**
- The effect of global change and long period tides on the Earth's rotation and gravitational potential p 14 N92-26781
- GLACIOLOGY**
- Sea level variation p 47 N93-24929
- GLOBAL AIR POLLUTION**
- Global climate change: Some implications, opportunities, and challenges for US forestry [DE92-040874] p 35 N93-17209
- Chemistry of the atmosphere: Its impact on global change. CHEMRAWN 7: Perspectives and recommendations [PB93-180644] p 48 N93-29670
- GLOBAL ATMOSPHERIC RESEARCH PROGRAM**
- Report of the Francophone African Workshop on the Human Dimensions of Global Change [HDGCP-FA-001] p 41 N93-71749
- GLOBAL POSITIONING SYSTEM**
- Mapping Tomorrow's Resources: A symposium on the uses of remote sensing, Geographic Information Systems (GIS), and Global Positioning Systems (GPS) for natural resources management p 17 N94-24357
- Remote sensing and the Mississippi high accuracy reference network p 19 N94-32466
- Assessment of satellite earth observation programs [NASA-CR-193279] p 20 N93-72477
- GLOBAL WARMING**
- Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2 [PB89-224943] p 22 N90-12981
- Climate projections with regional resolution [DE90-000858] p 22 N90-14715
- Carbon dioxide and climate: Summaries of research in FY 1989 [DE90-001791] p 22 N90-14723
- US energy use: New technologies and policies in response to global warming [DE90-002170] p 22 N90-14724
- Global climate change and NEPA (National Environmental Policy Act) analyses [DE90-003704] p 22 N90-15540
- Global climate change: A fossil energy perspective [DE90-003770] p 23 N90-15541
- Scientific linkages in global change [PB90-112608] p 23 N90-16356
- Effects of global climate change on agroecosystems: Scope of work [PB90-120023] p 23 N90-18813
- Options for controlling the global warming impact from motor vehicles [PB90-161688] p 23 N90-28142
- Policy options for stabilizing global climate. Volume 1: Chapters 1-6 [PB90-182304] p 23 N90-28146
- Responding to the threat of global warming: Options for the Pacific and Asia [DE90-014756] p 24 N90-28918
- Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 1 [PB90-171588] p 24 N91-10394
- Potential effects of global climate change on the United States. Appendix A: Water resources [PB90-171968] p 24 N91-10395
- Potential effects of global climate change on the United States. Appendix B: Sea level rise [PB90-172628] p 24 N91-10396
- Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 2 [PB90-171596] p 24 N91-10397
- Potential effects of global climate change on the United States. Appendix D: Forests [PB90-173238] p 24 N91-10398
- Potential effects of global climate change on the United States. Appendix E: Aquatic resources [PB90-172297] p 25 N91-10399
- Potential effects of global climate change on the United States. Appendix F: Air quality [PB90-172230] p 25 N91-10400
- Potential effects of global climate change on the United States. Appendix G: Health [PB90-173881] p 25 N91-10401
- Potential effects of global climate change on the United States. Appendix H: Infrastructure [PB90-172313] p 25 N91-10402
- Potential effects of global climate change on the United States. Appendix I: Variability [PB90-173899] p 25 N91-10403
- Potential effects of global climate change on the United States. Appendix J: Policy [PB90-173188] p 25 N91-10404
- Solving global environmental problems through technological innovation [DE90-010018] p 25 N91-16446
- Potential responses of landscape boundaries to global environmental change [DE90-008568] p 26 N91-16451
- Global Change and Our Common Future. Papers from a Forum [LC-89-62950] p 26 N91-17453
- Global change and carrying capacity: Implications for life on Earth p 26 N91-17454
- The US global change research program: An assessment of the FY 1991 plans [LC-90-62105] p 26 N91-17457
- The global climate system: Climate system monitoring, June 1986 to November 1988 [CSM-R-84/86] p 44 N91-17504
- Global change: What you can do [S-HRG-101-1160] p 26 N91-19528
- The dilemma of fossil fuel use and global climate change [DE91-007859] p 27 N91-19533
- Thermohaline circulations and global climate change [DE91-007458] p 27 N91-19537
- Statistical examination of climatological data relevant to global temperature variation [DE91-007881] p 27 N91-19540
- Global warming: Transportation and energy considerations, 1990 [PB91-118919] p 27 N91-20567
- Our changing planet: The FY 1992 US global change research program. A supplement to the US President's fiscal year 1992 budget p 28 N91-24690
- Climate and society in 20th century Mexico p 45 N91-27600
- Climate change: Problems of limits and policy responses p 28 N92-10232
- Assessing and managing the risks of climate change p 28 N92-10233
- Climate and forests p 28 N92-10234
- Human dimensions of global change: Toward a research agenda p 29 N92-10238
- Epilogue p 29 N92-10240
- Report of the International Ozone Trends Panel 1988, volume 2 [NASA-TM-105119] p 29 N92-15457
- Sensitivity of climate models: Comparison of simulated and observed patterns for past climates [DE92-002820] p 30 N92-16503
- Greenhouse effect: DOE's programs and activities relevant to the global warming phenomenon [GAO/RCED-90-74BR] p 30 N92-20647
- The 1991 Woodlands Conference: The Regions and Global Warming: Impacts and Response Strategies [DE92-003221] p 30 N92-24671
- Limiting net greenhouse gas emissions in the United States [DE92-007267] p 30 N92-25313
- Global warming. Emission reductions possible as scientific uncertainties are resolved [GAO/RCED-90-58] p 31 N92-25415
- Equilibrium-analysis of projected climate change effects on the global soil organic matter pool [PB92-153022] p 31 N92-26509
- The effect of global change and long period tides on the Earth's rotation and gravitational potential p 14 N92-26781
- Sensitivity of global warming potentials to the assumed background atmosphere [DE92-011072] p 31 N92-27417
- Our changing planet: The FY 1993 US global change research program. A supplement to the US President's fiscal year 1993 budget [NASA-CR-190675] p 32 N92-31259
- Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee [DE92-014798] p 32 N92-31896
- The uncertainties of global temperatures in the global warming context [TABES PAPER 92-447] p 32 N92-32014
- Radiative forcing of climate p 33 N93-11094
- Global Climate Change (GCC) issues and their impacts on the US Army Corps of Engineers [AD-A247279] p 34 N93-11466
- Reports to the Nation on our changing planet. Winter 1991 No. 1: The climate system [NASA-CR-190954] p 45 N93-11880
- The uses and limits of economic models as a climate change policy tool [DE92-015792] p 34 N93-12474
- Earth science information: Planning for the integration and use of global change information [NASA-CR-191217] p 51 N93-12660

- Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092
- Sensitivity of direct global warming potentials to key uncertainties
[DE92-041045] p 35 N93-16298
- Global climate change: Some implications, opportunities, and challenges for US forestry
[DE92-040874] p 35 N93-17209
- Global change research: Summaries of research in FY 1992
[DE93-002859] p 35 N93-18405
- Thermohaline circulations and global climate change
[DE93-004601] p 36 N93-19505
- Global temperature variations
p 45 N93-20068
- Global Change Data Base Pilot (Diskette) Project for Africa. Data base documentation version 1.1
[PB93-117927] p 43 N93-21686
- Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO₂ effects
[DE93-002347] p 37 N93-22972
- General circulation model output for forest climate change research and applications
[PB93-124626] p 37 N93-24015
- Sea level variation
p 47 N93-24929
- Analysis of LARI sensor system
[DE93-006334] p 37 N93-24977
- Trend survey on the elucidation of the global warming mechanism by the governments of major industrialized nations
[DE93-776427] p 38 N93-29672
- The role of clouds and oceans in global greenhouse warming
[DE93-016206] p 38 N94-13079
- EOS SAR: A new approach
p 4 N94-15904
- A summary of microwave remote sensing investigations planned for BOREAS
p 17 N94-15914
- Discrimination among semi-arid landscape endmembers using the Spectral Angle Mapper (SAM) algorithm
p 17 N94-16711
- Incorporating global warming risks in power sector planning. Volume 1: A case study of the New England region
[DE93-015241] p 39 N94-17289
- Biophysical characterization and surface radiation balance
[NASA-CR-194659] p 39 N94-17762
- Health effects of global warming: Problems in assessment
[DE93-040323] p 39 N94-19930
- Climate forcings and feedbacks
p 46 N94-21641
- Accuracy requirements --- for monitoring of climate changes
p 46 N94-21642
- Lightning, atmospheric electricity, and climate change
[DE94-002003] p 46 N94-23471
- National US public policy on global warming derived from optimization of energy use and environmental impact studies
[DE94-004606] p 40 N94-32790
- Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry
[DE94-007846] p 40 N94-32817
- Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881
- Current policies of the major countries coping with the global warming problem and the energy demand and supply
[DE94-757291] p 40 N94-32920
- America's climate change strategy: An action agenda
p 41 N91-71330
- Reports to the nation on our changing planet. The climate system. Winter 1991, no. 1
p 41 N91-71392
- Exploring global change: The benefits and disadvantages of microsatellite, lightsatellite, and megasatellite architectures
[DE92-009513] p 41 N92-70838
- Atmospheric radiation measurement: A program for improving radiative forcing and feedback in general circulation models
[DE92-014263] p 43 N93-70092
- Reconstruction of spatial patterns of climatic anomalies during the medieval warm period (AD 900-1300)
[DE94-006637] p 47 N94-72025
- GOALS**
- Advanced technology needs for a global change science program: Perspective of the Langley Research Center
[NASA-TM-4196] p 12 N91-14634
- Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-101849] p 20 N90-70833

GOES SATELLITES

- Research programs: Meteorological prediction. Oceanic processes. Climate and global change monitoring. Satellite instrumentation and calibration
p 44 N90-25447

GOVERNMENT/INDUSTRY RELATIONS

- Civil land remote sensing system
[GPO-87-070] p 7 N82-22630
- LANDSAT Commercialization
[GPO-49-336] p 10 N86-16696
- Landsat as a commercial enterprise
[INPE-5477-TAE/019] p 16 N94-11524

GOVERNMENTS

- Trend survey on the elucidation of the global warming mechanism by the governments of major industrialized nations
[DE93-776427] p 38 N93-29672
- Highlights of the National Conference of State Legislatures: Legislative Workshop on State Uses of Satellite Remote Sensing no. 3
[NASA-CR-173790] p 19 N84-74962

GRAPH THEORY

- Development of a prototype spatial information processing system for hydrologic research
[NASA-CR-191224] p 14 N92-32590

GRAPHS (CHARTS)

- Plots of ground coverage achievable by global change monitoring instruments and spacecraft
p 14 N92-15476
- Trends 1991: A compendium of data on global change
[DE92-011733] p 32 N92-31907

GRASSLANDS

- Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi
p 21 N94-71229

GRAVITATION

- The effect of global change and long period tides on the Earth's rotation and gravitational potential
p 14 N92-26781

GRAVITATIONAL FIELDS

- The effect of global change and long period tides on the Earth's rotation and gravitational potential
p 14 N92-26781

GREENHOUSE EFFECT

- Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981
- Climate projections with regional resolution
[DE90-000858] p 22 N90-14715
- Carbon dioxide and climate: Summaries of research in FY 1989
[DE90-001791] p 22 N90-14723
- US energy use: New technologies and policies in response to global warming
[DE90-002170] p 22 N90-14724
- Global climate change: A fossil energy perspective
[DE90-003770] p 23 N90-15541
- Scientific linkages in global change
[PB90-112608] p 23 N90-16356
- Effects of global climate change on agroecosystems: Scope of work
[PB90-120023] p 23 N90-18813
- Policy options for stabilizing global climate. Volume 1: Chapters 1-6
[PB90-182304] p 23 N90-28146
- Responding to the threat of global warming: Options for the Pacific and Asia
[DE90-014756] p 24 N90-28918
- Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 1
[PB90-171588] p 24 N91-10394
- Potential effects of global climate change on the United States. Appendix A: Water resources
[PB90-171968] p 24 N91-10395
- Potential effects of global climate change on the United States. Appendix B: Sea level rise
[PB90-172628] p 24 N91-10396
- Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 2
[PB90-171596] p 24 N91-10397
- Potential effects of global climate change on the United States. Appendix D: Forests
[PB90-173238] p 24 N91-10398
- Potential effects of global climate change on the United States. Appendix E: Aquatic resources
[PB90-172297] p 25 N91-10399
- Potential effects of global climate change on the United States. Appendix F: Air quality
[PB90-172230] p 25 N91-10400
- Potential effects of global climate change on the United States. Appendix G: Health
[PB90-173881] p 25 N91-10401
- Potential effects of global climate change on the United States. Appendix H: Infrastructure
[PB90-172313] p 25 N91-10402

- Potential effects of global climate change on the United States. Appendix I: Variability
[PB90-173899] p 25 N91-10403
- Potential effects of global climate change on the United States. Appendix J: Policy
[PB90-173188] p 25 N91-10404
- TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632
- Solving global environmental problems through technological innovation
[DE90-010018] p 25 N91-16446
- The dilemma of fossil fuel use and global climate change
[DE91-007859] p 27 N91-19533
- Thermohaline circulations and global climate change
[DE91-007458] p 27 N91-19537
- Global warming: Transportation and energy considerations, 1990
[PB91-118919] p 27 N91-20567
- Global change and biodiversity loss: Some impediments to response
p 27 N91-22622
- Our changing planet: The FY 1991 research plan of the US global change research program
[PB91-145813] p 28 N91-24687
- Climate change: Problems of limits and policy responses
p 28 N92-10232
- Human dimensions of global change: Toward a research agenda
p 29 N92-10238
- Epilogue
p 29 N92-10240
- Greenhouse effect: DOE's programs and activities relevant to the global warming phenomenon
[GAO/RCED-90-74BR] p 30 N92-20647
- Limiting net greenhouse gas emissions in the United States
[DE92-007267] p 30 N92-25313
- Global warming. Emission reductions possible as scientific uncertainties are resolved
[GAO/RCED-90-58] p 31 N92-25415
- Sensitivity of global warming potentials to the assumed background atmosphere
[DE92-011072] p 31 N92-27417
- The detection of climate change due to the enhanced greenhouse effect
[NASA-TM-107965] p 31 N92-31258
- Trends 1991: A compendium of data on global change
[DE92-011733] p 32 N92-31907
- Global Climate Change (GCC) issues and their impacts on the US Army Corps of Engineers
[AD-A247279] p 34 N93-11466
- Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092
- Sensitivity of direct global warming potentials to key uncertainties
[DE92-041045] p 35 N93-16298
- Global climate change: Some implications, opportunities, and challenges for US forestry
[DE92-040874] p 35 N93-17209
- Global change research: Summaries of research in FY 1992
[DE93-002859] p 35 N93-18405
- Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO₂ effects
[DE93-002347] p 37 N93-22972
- Sea level variation
p 47 N93-24929
- Analysis of LARI sensor system
[DE93-006334] p 37 N93-24977
- Trends '91: A compendium of data on global change. Highlights
[DE93-003112] p 38 N93-25144
- The role of clouds and oceans in global greenhouse warming
[DE93-016206] p 38 N94-13079
- Incorporating global warming risks in power sector planning. Volume 1: A case study of the New England region
[DE93-015241] p 39 N94-17289
- Health effects of global warming: Problems in assessment
[DE93-040323] p 39 N94-19930
- Accuracy requirements --- for monitoring of climate changes
p 46 N94-21642
- Global change research: Summaries of research in FY 1993
[DE94-003150] p 40 N94-28473
- Role of satellite observations of sea-surface temperature in the detection of global change
[PB94-138120] p 18 N94-29107
- National US public policy on global warming derived from optimization of energy use and environmental impact studies
[DE94-004606] p 40 N94-32790

- Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry [DE94-007846] p 40 N94-32817
- Ocean variability and its influence on the detectability of greenhouse warming signals [DE94-008670] p 48 N94-32881
- The Greenhouse Effect: Projections of global climate change p 41 N88-70493
- Climate change and stratospheric ozone depletion: Need for more than the current minimalist response p 41 N88-70502
- Reports to the nation on our changing planet. The climate system. Winter 1991, no. 1 p 41 N91-71392
- Toward an understanding of global change [NASA-CR-190167] p 41 N92-70346
- Exploring global change: The benefits and disadvantages of microsatellite, lightsatellite, and megasatellite architectures [DE92-009513] p 41 N92-70838
- GROUND BASED CONTROL**
- NASDA's view of ground control in mission operations p 4 N94-23835
- GROUND STATIONS**
- The spot operational remote sensing satellite system: Current status and perspectives p 8 N85-20776
- Applications of ISES for the atmospheric sciences p 42 N90-27155
- GROUND TRUTH**
- Methods for complex space experiment in USSR for studying land from manned spacecraft p 9 N86-14181
- From pattern to process: The strategy of the Earth Observing System: Volume 2: EOS Science Steering Committee report [NASA-TM-89702] p 11 N88-15283
- Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 51 N93-25798
- Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 52 N93-29234
- The Greenhouse Effect: Projections of global climate change p 41 N88-70493
- GULF OF MEXICO**
- Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms p 2 N91-28079
- H**
- HABITABILITY**
- NASA's land remote sensing plans for the 1980's p 8 N85-23224
- The US global change research program: Early achievements and future directions p 36 N93-18864
- HALLEY'S COMET**
- Research contributions in astronomy, satellite remote sensing p 10 N86-20947
- HARDWARE UTILIZATION LISTS**
- Physical and performance characteristics of instruments selected for global change monitoring p 5 N92-15475
- HEALTH**
- Potential effects of global climate change on the United States. Appendix G: Health [PB90-173881] p 25 N91-10401
- HEALTH PHYSICS**
- Potential effects of global climate change on the United States. Appendix G: Health [PB90-173881] p 25 N91-10401
- HEAT FLUX**
- Application of optical remote sensing to the study of surface fluxes related to cloud formation [DE93-003783] p 45 N93-25125
- HIERARCHIES**
- Hierarchy theory and global change [DE86-005154] p 44 N86-31190
- HIGH RESOLUTION**
- Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 51 N93-25798
- Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 52 N93-29234
- JPL activities on development of acousto-optic tunable filter imaging spectrometer p 5 N94-16696
- HISTORIES**
- What's past is prologue: Supporting global change research with historical data [DE93-005777] p 38 N93-30009
- HOOP COLUMN ANTENNAS**
- Hoop column soil moisture spacecraft in low Earth orbit for global change monitoring p 3 N92-15470
- HUMAN BEHAVIOR**
- Human dimensions of global change: Toward a research agenda p 29 N92-10238

HUMAN BEINGS

Global change and carrying capacity: Implications for life on Earth p 26 N91-17454

HUMAN REACTIONS

Human dimensions of global change: Toward a research agenda p 29 N92-10238

HUMIDITY

Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite [INPE-5444-TDI/490] p 46 N94-13614

HYDROLOGICAL CYCLE

Our Changing Planet: The FY 1993 US Global Change Research Program. A report by the Committee on Earth and Environmental Sciences, a supplement to the US President's fiscal year 1993 budget [PB92-156892] p 32 N92-31620

Global change research related to the Earth's energy and hydrologic cycle [NASA-CR-195270] p 40 N94-27430

The Earth observing system [NASA-TM-102942] p 20 N91-70662

HYDROLOGY

Global change in the geosphere-biosphere: Priorities for an IGBP (International Geosphere-Biosphere Program) [DE87-005034] p 21 N87-22313

Development of a prototype spatial information processing system for hydrologic research [NASA-CR-191224] p 14 N92-32590

Reports to the Nation on our changing planet. Winter 1991 No. 1: The climate system [NASA-CR-190954] p 45 N93-11880

IMAGE ANALYSIS

The integration of remote sensing, geographic information system, and expert system technologies for landcover classification p 49 N91-23733

Multi-temporal satellite image analysis for crop inventories in the Po River Valley (Italy) p 15 N93-25434

Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi p 21 N94-71229

IMAGE PROCESSING

Earth Observing System. Science and mission requirements, volume 1, part 1 [NASA-TM-86129-VOL-1-PT-1] p 5 N84-30450

Contribution to space program reviewed p 1 N85-26834

Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3 [NASA-CR-179769] p 11 N86-32863

Remote sensing information sciences research group [NASA-CR-183374] p 11 N89-14481

Satellite image processing using symbolic structures of reduced vision conditions [INPE-4638-TDL/337] p 49 N89-27367

Scan-line methods in spatial data systems [AD-A231165] p 50 N91-21973

Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms p 2 N91-28079

GIS: Geographic Information Systems. State of the art and future tendencies [INPE-5358-NTC/301] p 51 N92-32227

Multi-temporal satellite image analysis for crop inventories in the Po River Valley (Italy) p 15 N93-25434

Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 51 N93-25798

What's past is prologue: Supporting global change research with historical data [DE93-005777] p 38 N93-30009

Space imagery processing: Methods and applications at the I.G.N.-France p 19 N83-70161

IMAGERY

Process thresholds: Report of Working Group Number 3 p 9 N85-32384

IMAGING SPECTROMETERS

JPL activities on development of acousto-optic tunable filter imaging spectrometer p 5 N94-16696

IMAGING TECHNIQUES

Preliminary study of LANDSAT imagery of Taiwan and its surroundings p 8 N84-35050

Sixteenth International Laser Radar Conference, part 1 [AD-A277077] p 5 N92-29228

Small satellites and RPA's in global-change research [AD-A260762] p 38 N93-25837

INDEXES (DOCUMENTATION)

Earth observations and global change decision making: A special bibliography, 1991 [NASA-SP-7092] p 13 N91-30588

INFORMATION DISSEMINATION

Study for an advanced civil earth remote sensing system. Volume 1: Executive summary [PB89-163257] p 12 N89-27231

Study for an advanced civil earth remote sensing system. Volume 2: Market and financial assessment [PB89-163265] p 12 N89-27232

Global change information support: A north-south coalition [NASA-TM-108983] p 36 N93-19940

Linking remote-sensing technology and global needs: A strategic vision [NASA-TM-109214] p 20 N94-70142

INFORMATION MANAGEMENT

Data policy and availability supporting global change research, development, and decision-making: An information perspective [NASA-TM-105137] p 13 N91-30592

Earth science information: Planning for the integration and use of global change information [NASA-CR-191217] p 51 N93-12660

Global change information support: A north-south coalition [NASA-TM-108983] p 36 N93-19940

US Global Change Data and Information Management Program Plan: A report by the Committee on Earth and Environmental Sciences [PB93-101293] p 36 N93-21695

INFORMATION RETRIEVAL

Data policy and availability supporting global change research, development, and decision-making: An information perspective [NASA-TM-105137] p 13 N91-30592

INFORMATION SYSTEMS

Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3 [NASA-CR-179769] p 11 N86-32863

International geosphere-biosphere program: A study of global change [PB88-142393] p 21 N88-19021

Earth system science: A program for global change [NASA-TM-101186] p 6 N89-22969

Advanced technology needs for a global change science program: Perspective of the Langley Research Center [NASA-TM-4196] p 12 N91-14634

Information technology and global change science [DE91-005020] p 26 N91-18492

Data policy and availability supporting global change research, development, and decision-making: An information perspective [NASA-TM-105137] p 13 N91-30592

Information data systems for a global change technology initiative architecture trade study p 51 N92-15473

Proceedings of the First Seminar on Geographic Information Systems in Zambia [PB92-207125] p 51 N93-11789

Earth science information: Planning for the integration and use of global change information [NASA-CR-191217] p 51 N93-12660

Global change information support: A north-south coalition [NASA-TM-108983] p 36 N93-19940

Trends '91: A compendium of data on global change. Highlights [DE93-003112] p 38 N93-25144

Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 51 N93-25798

The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report [NASA-TM-109847] p 19 N94-34018

Linking remote-sensing technology and global needs: A strategic vision [NASA-TM-109214] p 20 N94-70142

INFRARED DETECTORS

Small satellites and RPA's in global-change research [AD-A260762] p 38 N93-25837

INFRARED IMAGERY

Small satellites and RPA's in global-change research [AD-A260762] p 38 N93-25837

INFRARED SPECTRA

Commercial applications multispectral sensor system p 16 N93-25615

INLAND WATERS

Potential effects of global climate change on the United States. Appendix E: Aquatic resources [PB90-172297] p 25 N91-10399

INTERNATIONAL COOPERATION

- International geosphere-biosphere program: A study of global change
[NASA-TM-142393] p 21 N88-19021
- International cooperation in remote sensing: The ESA experience
p 52 N88-24038
- The highlights of 1989
[NASA-TM-104985] p 6 N91-24669
- Report of the International Ozone Trends Panel 1988, volume 2
[NASA-TM-105119] p 29 N92-15457
- Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee
[DE92-014798] p 32 N92-31896
- Minutes of the Sixth CEOS Plenary Meeting
[NASA-TM-108252] p 4 N94-14112
- Current policies of the major countries coping with the global warming problem and the energy demand and supply
[DE94-757291] p 40 N94-32920
- Climate change and stratospheric ozone depletion: Need for more than the current minimalist response
p 41 N88-70502

- Toward an understanding of global change
[NASA-CR-190167] p 41 N92-70346
- The Human Dimensions of Global Change: An International Programme on Human Interactions with the Earth
p 42 N93-71957

INTERNATIONAL GEOSPHERE-BIOSPHERE PROGRAM

- Global change in the geosphere-biosphere: Initial priorities for an IGBP
[NASA-CR-176519] p 42 N86-20992
- Global change in the geosphere-biosphere: Priorities for an IGBP (International Geosphere-Biosphere Program)
[DE87-005034] p 21 N87-22313
- International geosphere-biosphere program: A study of global change
[PB88-142393] p 21 N88-19021

INTERNATIONAL RELATIONS

- Landsat as a commercial enterprise
[INPE-5477-TAE/019] p 16 N94-11524

ITOS SATELLITES

- Research programs: Meteorological prediction, Oceanic processes, Climate and global change monitoring, Satellite instrumentation and calibration
p 44 N90-25447

J

JAPANESE SPACE PROGRAM

- NASDA's view of ground control in mission operations
p 4 N94-23835

K

KNOWLEDGE BASES (ARTIFICIAL INTELLIGENCE)

- Remote sensing information sciences research group: Browse in the EOS era
[NASA-CR-184637] p 11 N89-22979

L

LAND MANAGEMENT

- Potential commercial uses of EOS remote sensing products
p 13 N91-24055

LAND USE

- Cosmonauts participate in multilevel remote sensing experiment
p 9 N85-33130
- Research, investigations and technical developments: National mapping program, 1983-1984
[PB86-166097] p 11 N86-26675
- Practical applications of remote sensing technology
[NASA-CR-186810] p 12 N90-26377
- Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms
p 2 N91-28079
- Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria
p 15 N93-14823
- Science priorities for the human dimensions of global change
p 40 N94-36987
- A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872

LANDFORMS

- Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] p 10 N86-17815

LANDMARKS

- Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] p 10 N86-17815

LANDSAT E

- Options in the global change fleet architecture provided by the presence of an EOS-A and -B
p 3 N92-15472

LANDSAT F

- Options in the global change fleet architecture provided by the presence of an EOS-A and -B
p 3 N92-15472

LANDSAT SATELLITES

- Status and outlook for NASA's Land Remote Sensing Program
p 7 N83-17988

LANDSAT Commercialization

- [GPO-49-336] p 10 N86-16696
- Earth observing system. Data and information system. Volume 2A: Report of the EOS Data Panel
[NASA-TM-87777] p 6 N86-31094

- A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
[NASA-CR-179704] p 11 N86-32828

- Space-based remote sensing of the Earth: A report to the Congress
[NASA-TM-89709] p 11 N88-18046

- Study for an advanced civil earth remote sensing system. Volume 1: Executive summary
[PB89-163257] p 12 N89-27231

- Study for an advanced civil earth remote sensing system. Volume 2: Market and financial assessment
[PB89-163265] p 12 N89-27232

- A remote sensing applications update: Results of interviews with Earth Observations Commercialization Program (EOCAP) participants
p 28 N91-22623

- Earth view: A business guide to orbital remote sensing
[NASA-CR-188238] p 13 N91-24671

- Landsat as a commercial enterprise
[INPE-5477-TAE/019] p 16 N94-11524

- Assessment of satellite earth observation programs
[NASA-CR-193279] p 20 N93-72477

LARGE SPACE STRUCTURES

- Global change technology architecture trade study
[NASA-TM-104128] p 29 N92-15464

LIFE SCIENCES

- Global Change: A Biogeochemical Perspective
[NASA-CR-173210] p 21 N84-16656

- The US global change research program: Early achievements and future directions
p 36 N93-18864

LIGHT SCATTERING

- Analysis of LARI sensor system
[DE93-006334] p 37 N93-24977

LIGHTNING

- Size, duration, and rate of growth of nocturnal lightning events appearing on space shuttle video tapes
[NASA-CR-4313] p 44 N90-28310

- Lightning, atmospheric electricity, and climate change
[DE94-002003] p 46 N94-23471

LIQUID PROPELLANT ROCKET ENGINES

- Civil space technology initiative
p 1 N89-11761

LOSSES

- Global change and biodiversity loss: Some impediments to response
p 27 N91-22622

LUNAR LUMINESCENCE

- Global change and the dark of the moon
[AD-A255181] p 52 N93-12380

LUNAR TIDES

- The effect of global change and long period tides on the Earth's rotation and gravitational potential
p 14 N92-26781

M

MAINTAINABILITY

- More sense for less cents: Cost effective servicing of remote sensing satellites
p 50 N94-11572

MAN ENVIRONMENT INTERACTIONS

- Global change in the geosphere-biosphere: Initial priorities for an IGBP
[NASA-CR-176519] p 42 N86-20992

- International geosphere-biosphere program: A study of global change
[PB88-142393] p 21 N88-19021

- Global change and biodiversity loss: Some impediments to response
p 27 N91-22622

- Equilibrium-analysis of projected climate change effects on the global soil organic matter pool
[PB92-153022] p 31 N92-26509

- Reports to the Nation on our changing planet. Winter 1991 No. 1: The climate system
[NASA-CR-190954] p 45 N93-11880

- Global change research: Science and policy
[DE93-015675] p 39 N94-16445

- Science priorities for the human dimensions of global change
p 40 N94-36987

- New technology and regional studies in human ecology: A Papua New Guinea example
p 42 N94-71231

MANAGEMENT

- Remote sensing of the Earth from Space: A program in crisis
[NASA-CR-176796] p 10 N86-25873

MANAGEMENT SYSTEMS

- Scan-line methods in spatial data systems
[AD-A231165] p 50 N91-21973

- Data policy and availability supporting global change research, development, and decision-making: An information perspective
[NASA-TM-105137] p 13 N91-30592

- Global change data base training exercise manual. Exploring Earth's environment: Africa as an example
[PB92-224682] p 36 N93-21211

- Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO2 effects
[DE93-002347] p 37 N93-22972

- Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa
p 52 N94-71237

- GLOBEC: Global Ocean Ecosystems Dynamics: A component of the US Global Change Research Program
[NASA-TM-105121] p 47 N92-11603

- Program on stimulating operational private sector use of Earth observation satellite information
[E82-10131] p 7 N82-21660

- Study for an advanced civil earth remote sensing system. Volume 2: Market and financial assessment
[PB89-163265] p 12 N89-27232

- Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3
[NASA-CR-179769] p 11 N86-32863

- Potential responses of landscape boundaries to global environmental change
[DE90-008568] p 26 N91-16451

- The uses and limits of economic models as a climate change policy tool
[DE92-015792] p 34 N93-12474

- Implementation strategy
p 6 N84-30453

- The effect of global change and long period tides on the Earth's rotation and gravitational potential
p 14 N92-26781

- Science requirements for a global change technology architecture trade study
[NASA-TM-104082] p 45 N91-25558

- Science requirements for a global change technology initiative architecture trade study
p 29 N92-15465

- The role of clouds and oceans in global greenhouse warming
[DE93-016206] p 38 N94-13079

- Research programs: Meteorological prediction, Oceanic processes, Climate and global change monitoring, Satellite instrumentation and calibration
p 44 N90-25447

- Acquisition of satellite remote sensing data in the Meteorological Service
p 47 N85-74434

- Assessment of satellite earth observation programs
[NASA-CR-193279] p 20 N93-72477

- Acquisition of satellite remote sensing data in the Meteorological Service
p 47 N85-74434

- TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632

- Climate and society in 20th century Mexico
p 45 N91-27600

- Practical applications of remote sensing technology
[NASA-CR-186810] p 12 N90-26377

- Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739

- Sensors research and technology
p 1 N89-11774

- Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite
[INPE-5444-TDI/490] p 46 N94-13614

SUBJECT INDEX

MICROWAVE EQUIPMENT

Earth Observing System. Science and mission requirements, volume 1, part 1
[NASA-TM-86129-VOL-1-PT-1] p 5 N84-30450

MICROWAVE IMAGERY

A summary of microwave remote sensing investigations planned for BOREAS p 17 N94-15914

MICROWAVE RADIOMETERS

Technology needs of advanced Earth observation spacecraft
[NASA-CR-3698] p 2 N84-17248

Microwave sensing technology issues related to a global change technology architecture trade study p 14 N92-15468

Hoop column soil moisture spacecraft in low Earth orbit for global change monitoring p 3 N92-15470
Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite
[INPE-5444-TDI/490] p 46 N94-13614

MICROWAVE SENSORS

Microwave sensing technology issues related to a global change technology architecture trade study p 14 N92-15468

Mission planning for an Earth observation low Earth orbiter: ERS-1 p 50 N94-23868

MILITARY OPERATIONS

Global Climate Change (GCC) issues and their impacts on the US Army Corps of Engineers
[AD-A247279] p 34 N93-11466

MISSION PLANNING

Satellite orbit considerations for a global change technology architecture trade study
[NASA-TM-104081] p 44 N91-25557

Global change technology initiative architecture trade study plan p 29 N92-15474

Physical and performance characteristics of instruments selected for global change monitoring p 5 N92-15475

Payload advisory panel recommendations
[NASA-TM-108012] p 1 N93-11528

Mission planning for an Earth observation low Earth orbiter: ERS-1 p 50 N94-23868

MISSISSIPPI

Remote sensing and the Mississippi high accuracy reference network p 19 N94-32466

MODELS

The Greenhouse Effect: Projections of global climate change p 41 N88-70493

MONOCHROMATORS

The detection and interpretation of long-term changes in ozone from space
[NASA-TM-101135] p 21 N88-27650

MORTALITY

Health effects of global warming: Problems in assessment
[DE93-040323] p 39 N94-19930

MOTOR VEHICLES

Options for controlling the global warming impact from motor vehicles
[PB90-161688] p 23 N90-28142

MULTIPOLAR FIELDS

X-SAR: The X-band synthetic aperture radar on board the Space Shuttle p 4 N94-15891

MULTISENSOR APPLICATIONS

From pattern to process: The strategy of the Earth Observing System: Volume 2: EOS Science Steering Committee report
[NASA-TM-89702] p 11 N88-15283

MULTISPECTRAL BAND SCANNERS

The spot operational remote sensing satellite system: Current status and perspectives p 8 N85-20776

N

NASA PROGRAMS

Research and technology, fiscal year 1983
[NASA-TM-85557] p 50 N84-20434

NASA's land remote sensing plans for the 1980's p 8 N85-23224

Earth system science: A program for global change
[NASA-TM-101186] p 6 N89-22969

NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438

Global change research and NASA's Earth Observing System
[PB94-126992] p 18 N94-31068

Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-101849] p 20 N90-70833

NATIONAL PARKS

Multisensor remote sensing data and GIS techniques for monitoring preservation areas: A case study
[INPE-5317-PRE/1714] p 16 N94-14131

NEEDS (DATA SYSTEM)

Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662

NIGERIA

Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria p 15 N93-14823

NORTH SEA

The effect of global change and long period tides on the Earth's rotation and gravitational potential p 14 N92-26781

NUMERICAL WEATHER FORECASTING

NASA/MSFC FY92 Earth Science and Applications Program Research Review
[NASA-CP-3184] p 45 N93-20067

O

OCEAN COLOR SCANNER

Remote sensing and geographic information systems: Implications for Global Marine Fisheries
[PB93-149409] p 15 N93-24309

OCEAN CURRENTS

Thermohaline circulations and global climate change
[DE91-007458] p 27 N91-19537

Tope/Posidon: A United States/France mission. Oceanography from space: The oceans and climate
[NASA-TM-108253] p 3 N94-10699

OCEAN DATA ACQUISITIONS SYSTEMS

Role of landscape research in development of space methods for studying Earth p 9 N86-14184

Research programs: Meteorological prediction. Oceanic processes. Climate and global change monitoring. Satellite instrumentation and calibration p 44 N90-25447

OCEAN DYNAMICS

GLOBEC: Global Ocean Ecosystems Dynamics: A component of the US Global Change Research Program
[NASA-TM-105121] p 47 N92-11603

OCEAN MODELS

Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881

OCEAN SURFACE

Science requirements for a global change technology architecture trade study
[NASA-TM-104082] p 45 N91-25558

Science requirements for a global change technology initiative architecture trade study p 29 N92-15465

Tope/Posidon: A United States/France mission. Oceanography from space: The oceans and climate
[NASA-TM-108253] p 3 N94-10699

OCEAN TEMPERATURE

Data sets and products p 47 N86-16856

OCEANOGRAPHIC PARAMETERS

Tenth Conference of Working Group of Socialist Countries on Remote Sensing of Earth under Intercosmos Program p 9 N85-26820

Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881

OCEANOGRAPHY

Nelopo describes Intercosmos-Black Sea experiment p 47 N84-18257

Global change in the geosphere-biosphere: Priorities for an IGBP (International Geosphere-Biosphere Program)
[DE87-005034] p 21 N87-22313

GLOBEC: Global Ocean Ecosystems Dynamics: A component of the US Global Change Research Program
[NASA-TM-105121] p 47 N92-11603

Reports to the Nation on our changing planet. Winter 1991 No. 1: The climate system
[NASA-CR-190954] p 45 N93-11880

Tope/Posidon: A United States/France mission. Oceanography from space: The oceans and climate
[NASA-TM-108253] p 3 N94-10699

Global change research: Summaries of research in FY 1993
[DE94-003150] p 40 N94-28473

OCEANS

Naval Remote Ocean Sensing System (NROSS) study
[NASA-CR-173109] p 7 N83-35466

The effect of global change and long period tides on the Earth's rotation and gravitational potential p 14 N92-26781

The role of clouds and oceans in global greenhouse warming
[DE93-016206] p 38 N94-13079

ON-LINE SYSTEMS

Data policy and availability supporting global change research, development, and decision-making: An information perspective
[NASA-TM-105137] p 13 N91-30592

PALEOCLIMATOLOGY

Global change data sets: Excerpts from the Master Directory, version 2.0
[NASA-TM-107994] p 33 N92-34028

OPTICAL MEASURING INSTRUMENTS

Application of optical remote sensing to the study of surface fluxes related to cloud formation
[DE93-003783] p 45 N93-25125

OPTICAL PROPERTIES

Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon p 17 N94-20961

Selected translated abstracts of Russian-language climate-change publications. 2: Clouds
[DE94-011465] p 47 N94-36244

OPTICAL RADAR

Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments p 43 N84-34864

Sixteenth International Laser Radar Conference, part 1
[AD-A277077] p 5 N92-29228

The role of lidars in global change research p 31 N92-29235

OPTICAL REFLECTION

Determining characteristics of optical radiation reflectors based on results of remote sensing p 8 N85-25358

ORBIT CALCULATION

Plots of ground coverage achievable by global change monitoring instruments and spacecraft p 14 N92-15476

ORBIT TRANSFER VEHICLES

Civil space technology initiative p 1 N89-11761

ORGANIC MATERIALS

Equilibrium-analysis of projected climate change effects on the global soil organic matter pool
[PB92-153022] p 31 N92-26509

OZONE

The detection and interpretation of long-term changes in ozone from space
[NASA-TM-101135] p 21 N88-27650

Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981

Report of the International Ozone Trends Panel 1988, volume 2
[NASA-TM-105119] p 29 N92-15457

Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO2 effects
[DE93-002347] p 37 N93-22972

Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry
[DE94-007846] p 40 N94-32817

OZONE DEPLETION

Scientific linkages in global change
[PB90-112608] p 23 N90-16356

Our changing planet: The FY 1991 research plan of the US global change research program
[PB91-145813] p 28 N91-24687

Report of the International Ozone Trends Panel 1988, volume 2
[NASA-TM-105119] p 29 N92-15457

Sensitivity of global warming potentials to the assumed background atmosphere
[DE92-011072] p 31 N92-27417

Our Changing Planet: The FY 1993 US Global Change Research Program. A report by the Committee on Earth and Environmental Sciences, a supplement to the US President's fiscal year 1993 budget
[PB92-156892] p 32 N92-31620

Radiative forcing of climate p 33 N93-11094

A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change
[DE92-019616] p 34 N93-12927

Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO2 effects
[DE93-002347] p 37 N93-22972

Climate change and stratospheric ozone depletion: Need for more than the current minimalist response p 41 N88-70502

OZONOSPHERE

Exploring global change: The benefits and disadvantages of microsatellite, lightsatellite, and megasatellite architectures
[DE92-009513] p 41 N92-70838

P

PACIFIC OCEAN

Responding to the threat of global warming: Options for the Pacific and Asia
[DE90-014756] p 24 N90-28918

PALEOCLIMATOLOGY

Reconstruction of spatial patterns of climatic anomalies during the medieval warm period (AD 900-1300)
[DE94-006637] p 47 N94-72025

PAPUA NEW GUINEA

New technology and regional studies in human ecology:
A Papua New Guinea example p 42 N94-71231

PAYLOADS

Global change technology architecture trade study
[NASA-TM-104128] p 29 N92-15464
Selection of representative instruments for a global
change technology architecture trade study
p 5 N92-15467
Payload advisory panel recommendations
[NASA-TM-108012] p 1 N93-11528

PENETRATION

X-SAR: The X-band synthetic aperture radar on board
the Space Shuttle p 4 N94-15891

PHOTOGRAMMETRY

Use of a priori evaluation of conditions for observing
Earth's surface from space for effective choice of time
for executing survey p 10 N86-20260
Research, investigations and technical developments:
National mapping program, 1983-1984
[PB86-166097] p 11 N86-26675
Design and development of the terrain information
extraction system p 13 N91-21623
[AD-A231166]
Proceedings of the First Seminar on Geographic
Information Systems in Zambia
[PB92-207125] p 51 N93-11789

PHOTOINTERPRETATION

Appendix C. LANDSAT: A worldwide perspective
p 7 N83-10471
APPS-4 (Analytical Photogrammetric Processing
System-4) remote sensing applications guide
[AD-A134977] p 8 N84-17676
Satellite image processing using symbolic structures of
reduced vision conditions
[INPE-4638-TDL/337] p 49 N89-27367
Space Shuttle radar (SIR-A) views near-East
volcanoes
[NASA-CR-175944] p 43 N85-73230

PHOTOMETRY

Sunphotometer network for monitoring aerosol
properties in the Brazilian Amazon p 17 N94-20961

PHYSICAL EXERCISE

Global change data base training exercise manual.
Exploring Earth's environment: Africa as an example
[PB92-224682] p 36 N93-21211

PLANETARY EVOLUTION

Earth system science: A program for global change
[NASA-TM-101186] p 6 N89-22969

PLANETARY STRUCTURE

Earth system science: A program for global change
[NASA-TM-101186] p 6 N89-22969

PLANTS (BOTANY)

Modeling the response of plants and ecosystems to
global change
[DE91-017403] p 28 N91-32587
Health effects of global warming: Problems in
assessment
[DE93-040323] p 39 N94-19930
Traditional anthropology and geographical information
systems in the collaborative study of Cassava in Africa
p 52 N94-71237

PLOTS

Plots of ground coverage achievable by global change
monitoring instruments and spacecraft p 14 N92-15476

PLOTTERS

APPS-4 (Analytical Photogrammetric Processing
System-4) remote sensing applications guide
[AD-A134977] p 8 N84-17676

POLAR ORBITS

Mission planning for an Earth observation low Earth
orbiter: ERS-1 p 50 N94-23868

POLAR REGIONS

Polar research from satellites
[NASA-CR-188025] p 43 N91-21640
Proceedings of International Conference on the Role
of the Polar Regions in Global Change, volume 1
[AD-A253027] p 32 N92-33578
Proceedings of International Conference on the Role
of the Polar Regions in Global Change, volume 2
[AD-A253028] p 33 N92-33579
International Conference on the Role of the Polar
Regions in Global Change: Proceedings, volume 1
[DE92-013652] p 33 N93-11232
International Conference on the Role of the Polar
Regions in Global Change: Proceedings, volume 2
[DE92-013653] p 33 N93-11233

POLICIES

Global climate change and NEPA (National
Environmental Policy Act) analyses
[DE90-003704] p 22 N90-15540
Policy options for stabilizing global climate. Volume 1:
Chapters 1-6
[PB90-182304] p 23 N90-28146

Potential effects of global climate change on the United
States. Appendix J: Policy
[PB90-173188] p 25 N91-10404

Global Change and Our Common Future. Papers from
a Forum
[LC-89-62950] p 26 N91-17453

Global warming: Transportation and energy
considerations, 1990
[PB91-118919] p 27 N91-20567

Our changing planet: The FY 1992 US global change
research program. A supplement to the US President's
fiscal year 1992 budget p 28 N91-24690

Data policy and availability supporting global change
research, development, and decision-making: An
information perspective
[NASA-TM-105137] p 13 N91-30592

Assessing and managing the risks of climate change
p 28 N92-10233

Our Changing Planet: The FY 1993 US Global Change
Research Program. A report by the Committee on Earth
and Environmental Sciences, a supplement to the US
President's fiscal year 1993 budget
[PB92-156892] p 32 N92-31620

National US public policy on global warming derived from
optimization of energy use and environmental impact
studies
[DE94-004606] p 40 N94-32790

Current policies of the major countries coping with the
global warming problem and the energy demand and
supply
[DE94-757291] p 40 N94-32920

Science priorities for the human dimensions of global
change p 40 N94-36987

POLITICS

Global Change and Our Common Future. Papers from
a Forum
[LC-89-62950] p 26 N91-17453

POLLUTION CONTROL

Options for controlling the global warming impact from
motor vehicles
[PB90-161688] p 23 N90-28142

Assessing and managing the risks of climate change
p 28 N92-10233

America's climate change strategy: An action agenda
p 41 N91-71330

POPULATION THEORY

Global change and carrying capacity: Implications for
life on Earth p 26 N91-17454

POPULATIONS

GLOBEC: Global Ocean Ecosystems Dynamics: A
component of the US Global Change Research Program
[NASA-TM-105121] p 47 N92-11603

POSEIDON SATELLITE

Topex/Poseidon: A United States/France mission.
Oceanography from space: The oceans and climate
[NASA-TM-108253] p 3 N94-10699

Assessment of satellite earth observation programs
[NASA-CR-193279] p 20 N93-72477

POSITIVE FEEDBACK

Equilibrium-analysis of projected climate change effects
on the global soil organic matter pool
[PB92-153022] p 31 N92-26509

PRECIPITATION (METEOROLOGY)

The global climate system: Climate system monitoring,
June 1986 to November 1988
[CSM-R-84/86] p 44 N91-17504

Global temperature variations p 45 N93-20068

PREDICTIONS

Global change in the geosphere-biosphere: Initial
priorities for an IGBP
[NASA-CR-176519] p 42 N86-20992

GLOBEC: Global Ocean Ecosystems Dynamics: A
component of the US Global Change Research Program
[NASA-TM-105121] p 47 N92-11603

Our changing planet: The FY 1993 US global change
research program. A supplement to the US President's
fiscal year 1993 budget
[NASA-CR-190675] p 32 N92-31259

PRESIDENTIAL REPORTS

Our Changing Planet: The FY 1993 US Global Change
Research Program. A report by the Committee on Earth
and Environmental Sciences, a supplement to the US
President's fiscal year 1993 budget
[PB92-156892] p 32 N92-31620

Economics and global change: The FY 1993 research
program on the economics of global change. A supplement
to the US President's FY 1993 budget and a companion
document to our changing planet
[PB93-101244] p 37 N93-21696

America's climate change strategy: An action agenda
p 41 N91-71330

PRIORITIES

Toward an understanding of global change: Initial
priorities for US contributions to the International
Geosphere-Biosphere Program
[NASA-CR-185873] p 21 N90-12980

Science priorities for the human dimensions of global
change p 40 N94-36987

PRODUCT DEVELOPMENT

Product development plans for operational satellite
products for the NOAA Climate and Global Change
Program: Special report no. 5 p 3 N92-16009

Center for Mapping, Ohio State University
p 14 N92-23655

Global warming impacts of CFC alternative technologies:
Combining fluorocarbon and CO2 effects
[DE93-002347] p 37 N93-22972

PRODUCTIVITY

Applications of ISES for the atmospheric sciences
p 42 N90-27155
NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438

PROJECT PLANNING

Implementation strategy p 6 N84-30453
The US global change research program: An
assessment of the FY 1991 plans
[LC-90-62105] p 26 N91-17457

Our changing planet: The FY 1991 research plan of
the US global change research program
[PB91-145813] p 28 N91-24687

Our changing planet: The FY 1992 US global change
research program. A supplement to the US President's
fiscal year 1992 budget p 28 N91-24690

Science requirements for a global change technology
architecture trade study
[NASA-TM-104082] p 45 N91-25558

Science requirements for a global change technology
initiative architecture trade study p 29 N92-15465

Product development plans for operational satellite
products for the NOAA Climate and Global Change
Program: Special report no. 5 p 3 N92-16009

Our Changing Planet: The FY 1993 US Global Change
Research Program. A report by the Committee on Earth
and Environmental Sciences, a supplement to the US
President's fiscal year 1993 budget
[PB92-156892] p 32 N92-31620

America's climate change strategy: An action agenda
p 41 N91-71330

PUBLIC HEALTH

The dilemma of fossil fuel use and global climate
change
[DE91-007859] p 27 N91-19533

The 1991 Woodlands Conference: The Regions and
Global Warming: Impacts and Response Strategies
[DE92-003221] p 30 N92-24671

Health effects of global warming: Problems in
assessment
[DE93-040323] p 39 N94-19930

R

RADAR DATA

Development of a prototype spatial information
processing system for hydrologic research
[NASA-CR-191224] p 14 N92-32590

RADAR MEASUREMENT

Sixteenth International Laser Radar Conference, part
1
[AD-A277077] p 5 N92-29228

The role of lidars in global change research
p 31 N92-29235

RADIATION MEASUREMENT

Small satellites and RPAs in global-change research,
summary and conclusions
[AD-A247855] p 3 N92-27388

Atmospheric radiation measurement: A program for
improving radiative forcing and feedback in general
circulation models
[DE92-014263] p 43 N93-70092

RADIATION TRANSPORT

Atmospheric radiation measurement: A program for
improving radiative forcing and feedback in general
circulation models
[DE92-014263] p 43 N93-70092

RADIATIVE HEAT TRANSFER

Selected translated abstracts of Russian-language
climate-change publications. 2: Clouds
[DE94-011465] p 47 N94-36244

RADIATIVE TRANSFER

Radiative forcing of climate p 33 N93-11094

RADIO ALTIMETERS

Topex/Poseidon: A United States/France mission.
Oceanography from space: The oceans and climate
[NASA-TM-108253] p 3 N94-10699

RADIOMETERS

Selection of representative instruments for a global
change technology architecture trade study
p 5 N92-15467

Analysis of LARI sensor system
[DE93-006334] p 37 N93-24977

- Commercial applications multispectral sensor system
p 16 N93-25615
- RADIOSONDES**
Global temperature variations p 45 N93-20068
- RAIN FORESTS**
Equilibrium-analysis of projected climate change effects on the global soil organic matter pool
[PB92-153022] p 31 N92-26509
Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092
Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite
[INPE-5444-TDI/490] p 46 N94-13614
New technology and regional studies in human ecology: A Papua New Guinea example p 42 N94-71231
- REAL TIME OPERATION**
Applications of ISES for the atmospheric sciences p 42 N90-27155
- RECOMMENDATIONS**
Toward an understanding of global change: Initial priorities for US contributions to the International Geosphere-Biosphere Program
[NASA-CR-185873] p 21 N90-12980
- REFLECTANCE**
Determining characteristics of optical radiation reflectors based on results of remote sensing p 8 N85-25358
Global change and the dark of the moon
[AD-A255181] p 52 N93-12380
Analysis of LARI sensor system
[DE93-006334] p 37 N93-24977
- REGIONAL PLANNING**
Potential effects of global climate change on the United States. Appendix H: Infrastructure
[PB90-172313] p 25 N91-10402
Potential effects of global climate change on the United States. Appendix J: Policy
[PB90-173188] p 25 N91-10404
- REGULATIONS**
Incorporating global warming risks in power sector planning. Volume 1: A case study of the New England region
[DE93-015241] p 39 N94-17289
- RELIEF MAPS**
Development of a prototype spatial information processing system for hydrologic research
[NASA-CR-191224] p 14 N92-32590
Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739
- REMOTE SENSING**
Civil land remote sensing systems
[GPO-35-265] p 6 N82-15497
Characterizing user requirements for future land observing satellites
[NASA-TM-83867] p 6 N82-17562
Program on stimulating operational private sector use of Earth observation satellite information
[E82-10131] p 7 N82-21660
Civil land remote sensing system
[GPO-87-070] p 7 N82-22630
Appendix C. LANDSAT: A worldwide perspective
p 7 N83-10471
Geographic research in the US Geological Survey: Bibliography, 1966 - 1980
[USGS-CIRC-865] p 42 N83-11639
Conference on Using Next Generation Earth Observation Satellites: Summary handbook
p 7 N83-12508
Status and outlook for NASA's Land Remote Sensing Program
p 7 N83-17988
Second Eastern Regional Remote Sensing Applications Conference
[E83-10189] p 7 N83-19141
Naval Remote Ocean Sensing System (NROSS) study
[NASA-CR-173109] p 7 N83-35466
Spaceborne SAR and sea ice
p 4 N84-16412
Technology needs of advanced Earth observation spacecraft
[NASA-CR-3698] p 2 N84-17248
APPS-4 (Analytical Photogrammetric Processing System-4) remote sensing applications guide
[AD-A134977] p 8 N84-17676
Nelep describes Intercosmos-Black Sea experiment
p 47 N84-18257
Remote sensing training for Corps of Engineering personnel: The university training module concept
[NASA-CR-175204] p 48 N84-20154
Research and technology, fiscal year 1983
[NASA-TM-85557] p 50 N84-20434
Earth Observing System. Science and mission requirements, volume 1, part 1
[NASA-TM-86129-VOL-1-PT-1] p 5 N84-30460
- Implementation strategy p 6 N84-30453
Azerbaijan Institute develops subsatellite measurement systems p 8 N84-31238
Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments
p 43 N84-34864
Preliminary study of LANDSAT imagery of Taiwan and its surroundings p 8 N84-35050
Upper Atmosphere Research Satellite (UARS) trade analysis
[NASA-CR-175269] p 2 N85-15774
Brazilian Remote Sensing Shuttle Experiment (BRESEX): Characteristics and future utilization on satellites
[INPE-3313-PRE/620] p 5 N85-19385
The spot operational remote sensing satellite system: Current status and perspectives p 8 N85-20776
The ESA remote sensing satellite system (ERS-1)
p 8 N85-20777
NASA's land remote sensing plans for the 1980's
p 8 N85-23224
Determining characteristics of optical radiation reflectors based on results of remote sensing p 8 N85-25358
Tenth Conference of Working Group of Socialist Countries on Remote Sensing of Earth under Intercosmos Program
p 9 N85-26820
Contribution to space program reviewed
p 1 N85-26834
Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877
Process thresholds: Report of Working Group Number 3
p 9 N85-32384
Cosmonauts participate in multilevel remote sensing experiment
p 9 N85-33130
Methods for complex space experiment in USSR for studying land from manned spacecraft
p 9 N86-14181
Role of landscape research in development of space methods for studying Earth
p 9 N86-14184
LANDSAT Commercialization
[GPO-49-336] p 10 N86-16696
Data sets and products
p 47 N86-16856
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archaeological site recognition
[E86-10021] p 10 N86-17815
Use of a priori evaluation of conditions for observing Earth's surface from space for effective choice of time for executing survey
p 10 N86-20260
Research contributions in astronomy, satellite remote sensing
p 10 N86-20947
Remote sensing of the Earth from Space: A program in crisis
[NASA-CR-176796] p 10 N86-25873
Research on enhancing the utilization of digital multispectral data and geographic information systems in global habitability studies
[NASA-CR-177294] p 10 N86-26669
Research, investigations and technical developments: National mapping program, 1983-1984
[PB86-166097] p 11 N86-26675
Earth observing system. Data and information system. Volume 2A: Report of the EOS Data Panel
[NASA-TM-87777] p 6 N86-31094
A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
[NASA-CR-179704] p 11 N86-32828
Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3
[NASA-CR-179769] p 11 N86-32863
From pattern to process: The strategy of the Earth Observing System: Volume 2: EOS Science Steering Committee report
[NASA-TM-89702] p 11 N88-15283
Space-based remote sensing of the Earth: A report to the Congress
[NASA-TM-89709] p 11 N88-18046
International cooperation in remote sensing: The ESA experience
p 52 N88-24038
The detection and interpretation of long-term changes in ozone from space
[NASA-TM-101135] p 21 N88-27650
Civil space technology initiative
p 1 N89-11761
Sensors research and technology
p 1 N89-11774
Remote sensing information sciences research group
[NASA-CR-183374] p 11 N89-14481
Earth system science: A program for global change
[NASA-TM-101186] p 6 N89-22969
Remote sensing information sciences research group: Browse in the EOS era
[NASA-CR-184637] p 11 N89-22979
- Study for an advanced civil earth remote sensing system. Volume 1: Executive summary
[PB89-163257] p 12 N89-27231
Study for an advanced civil earth remote sensing system. Volume 2: Market and financial assessment
[PB89-163265] p 12 N89-27232
An assessment of information demands for remote sensing and Geographic Information System technologies
[PB89-159313] p 12 N89-27233
Satellite image processing using symbolic structures of reduced vision conditions
[INPE-4638-TDL/337] p 49 N89-27367
Analysis and modelling of spatial data proposal of a system for CBERS
[INPE-4911-PRE/1512] p 12 N90-21445
Practical applications of remote sensing technology
[NASA-CR-186810] p 12 N90-26377
Applications of ISES for the atmospheric sciences
p 42 N90-27155
Size, duration, and rate of growth of nocturnal lightning events appearing on space shuttle video tapes
[NASA-CR-4313] p 44 N90-28310
Advanced technology needs for a global change science program: Perspective of the Langley Research Center
[NASA-TM-4196] p 12 N91-14634
NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438
Proposed methodology for the study of urban environment and space structure in metropolitan area
[INPE-5203-PRE/1665] p 2 N91-21216
Design and development of the terrain information extraction system
[AD-A231166] p 13 N91-21623
Polar research from satellites
[NASA-CR-188025] p 43 N91-21640
Scan-line methods in spatial data systems
[AD-A231165] p 50 N91-21973
Research in geosciences policy
[NASA-CR-188038] p 27 N91-22619
A remote sensing applications update: Results of interviews with Earth Observations Commercialization Program (EOCAP) participants
p 28 N91-22623
The integration of remote sensing, geographic information system, and expert system technologies for landcover classification
p 49 N91-23733
Potential commercial uses of EOS remote sensing products
p 13 N91-24055
The highlights of 1989
[NASA-TM-104985] p 6 N91-24669
Earth view: A business guide to orbital remote sensing
[NASA-CR-188238] p 13 N91-24671
Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms
p 2 N91-28079
Soviet participation in FIFE-1989 remote sensing study
p 13 N91-30173
Need for expanded environmental measurement capabilities in geosynchronous Earth orbit
[NASA-CR-183487] p 29 N92-14490
Microwave sensing technology issues related to a global change technology architecture trade study
p 14 N92-15468
Sunsynchronous low Earth orbit spacecraft concepts and technology requirements for global change monitoring
p 2 N92-15469
Geostationary orbit Earth science platform concepts for global change monitoring
p 3 N92-15471
Product development plans for operational satellite products for the NOAA Climate and Global Change Program: Special report no. 5
p 3 N92-16009
Global ecosystems database. Version 0.1 (beta-test). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Prototype 1: Database documentation. NGDC key to geophysical records documentation No. 25. User's manual
[PB92-122803] p 30 N92-21439
Center for Mapping, Ohio State University
p 14 N92-23655
Sixteenth International Laser Radar Conference, part 1
[AD-A277077] p 5 N92-29228
Geographic information system and its applications
p 14 N92-30915
The detection of climate change due to the enhanced greenhouse effect
[NASA-TM-107965] p 31 N92-31258
GIS: Geographic Information Systems. State of the art and future tendencies
[INPE-5358-NTC/301] p 51 N92-32227
Development of a prototype spatial information processing system for hydrologic research
[NASA-CR-191224] p 14 N92-32590
Payload advisory panel recommendations
[NASA-TM-108012] p 1 N93-11528

Proceedings of the First Seminar on Geographic Information Systems in Zambia
[PB92-207125] p 51 N93-11789

Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria p 15 N93-14823

Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739

NASA/MSFC FY92 Earth Science and Applications Program Research Review
[NASA-CP-3184] p 45 N93-20067

Global temperature variations p 45 N93-20068

Remote sensing and geographic information systems: Implications for Global Marine Fisheries
[PB93-149409] p 15 N93-24309

Application of optical remote sensing to the study of surface fluxes related to cloud formation
[DE93-003783] p 45 N93-25125

Multi-temporal satellite image analysis for crop inventories in the Po River Valley (Italy) p 15 N93-25434

Commercial applications multispectral sensor system p 16 N93-25615

Detecting the scale and resolution effects in remote sensing and GIS p 16 N93-25707

Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 51 N93-25798

Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 52 N93-29234

What's past is prologue: Supporting global change research with historical data
[DE93-005777] p 38 N93-30009

Topex/Poseidon: A United States/France mission. Oceanography from space: The oceans and climate
[NASA-TM-108253] p 3 N94-10699

Landsat as a commercial enterprise
[INPE-5477-TAE/019] p 16 N94-11524

More sense for less cents: Cost effective servicing of remote sensing satellites p 50 N94-11572

Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite
[INPE-5444-TDI/490] p 46 N94-13614

Minutes of the Sixth CEOS Plenary Meeting
[NASA-TM-108252] p 4 N94-14112

Multisensor remote sensing data and GIS techniques for monitoring preservation areas: A case study
[INPE-5317-PRE/1714] p 16 N94-14131

Views from space
[NASA-TM-109634] p 16 N94-15245

X-SAR: The X-band synthetic aperture radar on board the Space Shuttle p 4 N94-15891

Driving terrestrial ecosystem models from space p 39 N94-15896

EOS SAR: A new approach p 4 N94-15904

A summary of microwave remote sensing investigations planned for BOREAS p 17 N94-15914

JPL activities on development of acousto-optic tunable filter imaging spectrometer p 5 N94-16696

Discrimination among semi-arid landscape endmembers using the Spectral Angle Mapper (SAM) algorithm p 17 N94-16711

Soil conservation applications with C-band SAR p 48 N94-16760

Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon p 17 N94-20961

Data format standards for civilian remote sensing satellites
[PB93-192920] p 17 N94-21446

NASDA's view of ground control in mission operations p 4 N94-23835

Mission planning for an Earth observation low Earth orbiter: ERS-1 p 50 N94-23868

Mapping Tomorrow's Resources: A symposium on the uses of remote sensing, Geographic Information Systems (GIS), and Global Positioning Systems (GPS) for natural resources management p 17 N94-24357

The potential for the Department of Defense to use space-based remote sensing to support DOD and other government agencies' environmental programs
[AD-A273895] p 18 N94-25656

Remote Earth Sciences data collection using ACTS
[NASA-CR-195227] p 18 N94-26236

Global change research related to the Earth's energy and hydrologic cycle
[NASA-CR-195270] p 40 N94-27430

A comparative study of SAR data compression schemes p 49 N94-28259

Role of satellite observations of sea-surface temperature in the detection of global change
[PB94-138120] p 18 N94-29107

Global change research and NASA's Earth Observing System
[PB94-126992] p 18 N94-31068

Remote sensing for urban planning p 18 N94-32465

Remote sensing and the Mississippi high accuracy reference network p 19 N94-32466

A collection of The Movies
[NASA-TM-109806] p 19 N94-33598

The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018

Insight to global change: EOS/SAR mission
[NASA-CR-196133] p 40 N94-35503

Selected translated abstracts of Russian-language climate-change publications. 2: Clouds
[DE94-011465] p 47 N94-36244

Earth sciences from space p 6 N81-76526

Space imagery processing: Methods and applications at the I.G.N.-France p 19 N83-70161

Utilisation of Spacelab for remote sensing of Earth resources p 19 N84-74448

Highlights of the National Conference of State Legislatures: Legislative Workshop on State Uses of Satellite Remote Sensing no. 3
[NASA-CR-173790] p 19 N84-74962

Space Shuttle radar (SIR-A) views near-East volcanoes
[NASA-CR-175944] p 43 N85-73230

Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372

Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661

Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664

Acquisition of satellite remote sensing data in the Meteorological Service p 47 N85-74434

A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872

The Greenhouse Effect: Projections of global climate change p 41 N88-70493

Climate change and stratospheric ozone depletion: Need for more than the current minimalist response p 41 N88-70502

Processing and analysis evaluation of SAR-580 data and MOS-1 airborne verification data
[NASDA-CP-03-8] p 20 N90-70417

Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-101849] p 20 N90-70833

The Earth observing system
[NASA-TM-102942] p 20 N91-70662

Sudden climate change: The land surface record
[NASA-CR-191691] p 41 N93-71155

Assessment of satellite earth observation programs
[NASA-CR-193279] p 20 N93-72477

Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-109214] p 20 N94-70142

Applications of Space-Age Technology in Anthropology
[NASA-TM-109395] p 49 N94-71223

Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi p 21 N94-71229

New technology and regional studies in human ecology: A Papua New Guinea example p 42 N94-71231

Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa p 52 N94-71237

REMOTE SENSORS

Sensors research and technology p 1 N89-11774

Global change technology initiative architecture trade study plan p 29 N92-15474

What's past is prologue: Supporting global change research with historical data
[DE93-005777] p 38 N93-30009

REMOTELY PILOTTED VEHICLES

Small satellites and RPAs in global-change research, summary and conclusions
[AD-A247855] p 3 N92-27388

REQUIREMENTS

Implementation strategy p 6 N84-30453

Advanced technology needs for a global change science program: Perspective of the Langley Research Center
[NASA-TM-41196] p 12 N91-14634

Science requirements for a global change technology architecture trade study
[NASA-TM-104082] p 45 N91-25558

Science requirements for a global change technology initiative architecture trade study p 29 N92-15465

RESEARCH

Earth system science: A program for global change
[NASA-TM-101186] p 6 N89-22969

The US global change research program: Early achievements and future directions p 36 N93-18864

RESEARCH AND DEVELOPMENT

The Human Dimensions of Global Change: An International Programme on Human Interactions with the Earth p 42 N93-71957

RESEARCH FACILITIES

Upper Atmosphere Research Satellite (UARS) trade analysis
[NASA-CR-175269] p 2 N85-15774

Sixteenth International Laser Radar Conference, part 1
[AD-A277077] p 5 N92-29228

RESEARCH MANAGEMENT

Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee
[DE92-014798] p 32 N92-31896

Toward an understanding of global change
[NASA-CR-190167] p 41 N92-70346

RESEARCH PROJECTS

The US global change research program: An assessment of the FY 1991 plans
[LC-90-62105] p 26 N91-17457

Polar research from satellites
[NASA-CR-188025] p 43 N91-21640

Our changing planet: The FY 1992 US global change research program. A supplement to the US President's fiscal year 1992 budget p 28 N91-24690

Global Change Research Program: A component of the US Global Change Research Program. 1993 research opportunities
[NSF-92-77] p 35 N93-18319

America's climate change strategy: An action agenda p 41 N91-71330

RESIDENTIAL AREAS

Remote sensing for urban planning p 18 N94-32465

RESOURCES MANAGEMENT

Second Eastern Regional Remote Sensing Applications Conference
[E83-10189] p 7 N83-19141

Remote sensing training for Corps of Engineering personnel: The university training module concept
[NASA-CR-175204] p 48 N84-20154

Research on enhancing the utilization of digital multispectral data and geographic information systems in global habitability studies
[NASA-CR-177294] p 10 N86-26669

Potential effects of global climate change on the United States. Appendix J: Policy
[PB90-173188] p 25 N91-10404

NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438

A remote sensing applications update: Results of interviews with Earth Observations Commercialization Program (EOCAP) participants p 28 N91-22623

Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria p 15 N93-14823

Mapping Tomorrow's Resources: A symposium on the uses of remote sensing, Geographic Information Systems (GIS), and Global Positioning Systems (GPS) for natural resources management p 17 N94-24357

Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-101849] p 20 N90-70833

RISK

Assessing and managing the risks of climate change p 28 N92-10233

ROCKS

Sudden climate change: The land surface record
[NASA-CR-191691] p 41 N93-71155

RURAL LAND USE

NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438

S

- SALYUT SPACE STATION**
Azerbaijan Institute develops subsatellite measurement systems p 8 N84-31238
- SATELLITE ALTIMETRY**
Topex/Poseidon: A United States/France mission. Oceanography from space: The oceans and climate [NASA-TM-108253] p 3 N94-10699
- SATELLITE COMMUNICATION**
Remote Earth Sciences data collection using ACTS [NASA-CR-195227] p 18 N94-26236
- SATELLITE CONFIGURATIONS**
Exploring global change: The benefits and disadvantages of microsatellite, lightsatellite, and megasatellite architectures [DE92-009513] p 41 N92-70838
- SATELLITE IMAGERY**
Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments p 43 N84-34864
Contribution to space program reviewed p 1 N85-26834
Methods for complex space experiment in USSR for studying land from manned spacecraft p 9 N86-14181
Research programs: Meteorological prediction. Oceanic processes. Climate and global change monitoring. Satellite instrumentation and calibration p 44 N90-25447
Practical applications of remote sensing technology [NASA-CR-186810] p 12 N90-26377
The integration of remote sensing, geographic information system, and expert system technologies for landcover classification p 49 N91-23733
Earth view: A business guide to orbital remote sensing [NASA-CR-188238] p 13 N91-24671
Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria p 15 N93-14823
Updating topographic maps using orbital images in a microcomputer environment [INPE-5409-PRE/1756] p 15 N93-19739
Multi-temporal satellite image analysis for crop inventories in the Po River Valley (Italy) p 15 N93-25434
Detecting the scale and resolution effects in remote sensing and GIS p 16 N93-25707
What's past is prologue: Supporting global change research with historical data [DE93-005777] p 38 N93-30009
A collection of The Movies [NASA-TM-109806] p 19 N94-33598
Applications of Space-Age Technology in Anthropology [NASA-TM-109395] p 49 N94-71223
Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi p 21 N94-71229
Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa p 52 N94-71237
- SATELLITE INSTRUMENTS**
Polar research from satellites [NASA-CR-188025] p 43 N91-21640
Information data systems for a global change technology initiative architecture trade study p 51 N92-15473
Mission planning for an Earth observation low Earth orbiter: ERS-1 p 50 N94-23868
- SATELLITE NETWORKS**
Product development plans for operational satellite products for the NOAA Climate and Global Change Program: Special report no. 5 p 3 N92-16009
- SATELLITE OBSERVATION**
Conference on Using Next Generation Earth Observation Satellites: Summary handbook p 7 N83-12508
Polar research from satellites [NASA-CR-188025] p 43 N91-21640
The highlights of 1989 [NASA-TM-104985] p 6 N91-24669
Earth view: A business guide to orbital remote sensing [NASA-CR-188238] p 13 N91-24671
Satellite orbit considerations for a global change technology architecture trade study [NASA-TM-104081] p 44 N91-25557
Soviet participation in FIFE-1989 remote sensing study p 13 N91-30173
Satellite orbit considerations for a global change technology architecture trade study p 1 N92-15466
Physical and performance characteristics of instruments selected for global change monitoring p 5 N92-15475
Product development plans for operational satellite products for the NOAA Climate and Global Change Program: Special report no. 5 p 3 N92-16009
- Global change data base training exercise manual. Exploring Earth's environment: Africa as an example [PB92-224682] p 36 N93-21211
Remote sensing and geographic information systems: Implications for Global Marine Fisheries [PB93-149409] p 15 N93-24309
Role of satellite observations of sea-surface temperature in the detection of global change [PB94-138120] p 18 N94-29107
Remote sensing and the Mississippi high accuracy reference network p 19 N94-32466
Assessment of satellite earth observation programs [NASA-CR-193279] p 20 N93-72477
- SATELLITE ORBITS**
Satellite orbit considerations for a global change technology architecture trade study [NASA-TM-104081] p 44 N91-25557
Satellite orbit considerations for a global change technology architecture trade study p 1 N92-15466
Plots of ground coverage achievable by global change monitoring instruments and spacecraft p 14 N92-15476
- SATELLITE-BORNE INSTRUMENTS**
Advanced technology needs for a global change science program: Perspective of the Langley Research Center [NASA-TM-4196] p 12 N91-14634
Commercial applications multispectral sensor system p 16 N93-25615
- SATELLITE-BORNE PHOTOGRAPHY**
Use of a priori evaluation of conditions for observing Earth's surface from space for effective choice of time for executing survey p 10 N86-20260
- SCANNERS**
Microwave sensing technology issues related to a global change technology architecture trade study p 14 N92-15468
- SCATTEROMETERS**
Naval Remote Ocean Sensing System (NROSS) study [NASA-CR-173109] p 7 N83-35466
- SCENE ANALYSIS**
Appendix C. LANDSAT: A worldwide perspective p 7 N83-10471
Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi p 21 N94-71229
- SCHEDULES**
Advanced technology needs for a global change science program: Perspective of the Langley Research Center [NASA-TM-4196] p 12 N91-14634
- SCHEDULING**
Mission planning for an Earth observation low Earth orbiter: ERS-1 p 50 N94-23868
- SCIENTIFIC SATELLITES**
Plots of ground coverage achievable by global change monitoring instruments and spacecraft p 14 N92-15476
- SEA ICE**
Spaceborne SAR and sea ice p 4 N84-16412
- SEA LEVEL**
Potential effects of global climate change on the United States. Appendix B: Sea level rise [PB90-172628] p 24 N91-10396
The effect of global change and long period tides on the Earth's rotation and gravitational potential p 14 N92-26781
Sea level variation p 47 N93-24929
Topex/Poseidon: A United States/France mission. Oceanography from space: The oceans and climate [NASA-TM-108253] p 3 N94-10699
- SEA SURFACE TEMPERATURE**
Remote sensing and geographic information systems: Implications for Global Marine Fisheries [PB93-149409] p 15 N93-24309
Role of satellite observations of sea-surface temperature in the detection of global change [PB94-138120] p 18 N94-29107
- SENSITIVITY**
Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2 [PB89-224943] p 22 N90-12981
Sensitivity of global warming potentials to the assumed background atmosphere [DE92-011072] p 31 N92-27417
- SHORELINES**
Potential effects of global climate change on the United States. Appendix B: Sea level rise [PB90-172628] p 24 N91-10396
- SHUTTLE IMAGING RADAR**
X-SAR: The X-band synthetic aperture radar on board the Space Shuttle p 4 N94-15891
Space Shuttle radar (SIR-A) views near-East volcanoes [NASA-CR-175944] p 43 N85-73230
- SIDELOBES**
Microwave sensing technology issues related to a global change technology architecture trade study p 14 N92-15468
- SINKS**
Climate change: Problems of limits and policy responses p 28 N92-10232
- SITE SELECTION**
A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program [NASA-CR-179704] p 11 N86-32828
- SMALL SCIENTIFIC SATELLITES**
Small satellites and RPAs in global-change research, summary and conclusions [AD-A247855] p 3 N92-27388
- SOCIAL FACTORS**
Climate and society in 20th century Mexico p 45 N91-27600
Earth science information: Planning for the integration and use of global change information [NASA-CR-191217] p 51 N93-12660
- SOCIOLOGY**
Global Change and Our Common Future. Papers from a Forum [LC-89-62950] p 26 N91-17453
- SOFTWARE ENGINEERING**
Practical applications of remote sensing technology [NASA-CR-186810] p 12 N90-26377
- SOIL MOISTURE**
Hoop column soil moisture spacecraft in low Earth orbit for global change monitoring p 3 N92-15470
Development of a prototype spatial information processing system for hydrologic research [NASA-CR-191224] p 14 N92-32590
- SOILS**
Equilibrium-analysis of projected climate change effects on the global soil organic matter pool [PB92-153022] p 31 N92-26509
X-SAR: The X-band synthetic aperture radar on board the Space Shuttle p 4 N94-15891
Soil conservation applications with C-band SAR p 48 N94-16760
Sudden climate change: The land surface record [NASA-CR-191691] p 41 N93-71155
Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi p 21 N94-71229
- SOLAR RADIATION**
Global change and the dark of the moon [AD-A255181] p 52 N93-12380
Analysis of LARI sensor system [DE93-006334] p 37 N93-24977
- SOLAR TERRESTRIAL INTERACTIONS**
International geosphere-biosphere program: A study of global change [PB88-142393] p 21 N88-19021
- SPACE BASED RADAR**
EOS SAR: A new approach p 4 N94-15904
- SPACE COMMERCIALIZATION**
Space-based remote sensing of the Earth: A report to the Congress [NASA-TM-89709] p 11 N88-18046
Center for Mapping, Ohio State University p 14 N92-23655
Landsat as a commercial enterprise [INPE-5477-TAE/019] p 16 N94-11524
- SPACE GLOSSARIES**
Tenth Conference of Working Group of Socialist Countries on Remote Sensing of Earth under Intercosmos Program p 9 N85-26820
- SPACE MAINTENANCE**
More sense for less cents: Cost effective servicing of remote sensing satellites p 50 N94-11572
- SPACE MISSIONS**
NASA's view of ground control in mission operations p 4 N94-23835
- SPACE PLASMAS**
Research and technology, fiscal year 1983 [NASA-TM-85557] p 50 N84-20434
- SPACE PLATFORMS**
Global change technology architecture trade study [NASA-TM-104128] p 29 N92-15466
- SPACE PROBES**
Research contributions in astronomy, satellite remote sensing p 10 N86-20947
- SPACE PROGRAMS**
Contribution to space program reviewed p 1 N85-26834
- SPACE SHUTTLE ORBITERS**
Views from space [NASA-TM-109634] p 16 N94-15245

SPACE SHUTTLE PAYLOADS

- Brazilian Remote Sensing Shuttle Experiment (BRESEX): Characteristics and future utilization on satellites
[INPE-3313-PRE/620] p 5 N85-19385
The detection and interpretation of long-term changes in ozone from space
[NASA-TM-101135] p 21 N88-27650

SPACE STATIONS

- Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3
[NASA-CR-179769] p 11 N86-32863
Satellite orbit considerations for a global change technology architecture trade study
[NASA-TM-104081] p 44 N91-25557

SPACEBORNE EXPERIMENTS

- Methods for complex space experiment in USSR for studying land from manned spacecraft
p 9 N86-14181

SPACEBORNE PHOTOGRAPHY

- Tenth Conference of Working Group of Socialist Countries on Remote Sensing of Earth under Intercosmos Program
p 9 N85-26820

SPACECRAFT CONFIGURATIONS

- Sunsynchronous low Earth orbit spacecraft concepts and technology requirements for global change monitoring
p 2 N92-15469
Hoop column soil moisture spacecraft in low Earth orbit for global change monitoring
p 3 N92-15470
Information data systems for a global change technology initiative architecture trade study
p 51 N92-15473

SPACECRAFT DESIGN

- Advanced technology needs for a global change science program: Perspective of the Langley Research Center
[NASA-TM-4196] p 12 N91-14634
Options in the global change fleet architecture provided by the presence of an EOS-A and -B
p 3 N92-15472
Global change technology initiative architecture trade study plan
p 29 N92-15474
Physical and performance characteristics of instruments selected for global change monitoring
p 5 N92-15475

SPACECRAFT INSTRUMENTS

- Sunsynchronous low Earth orbit spacecraft concepts and technology requirements for global change monitoring
p 2 N92-15469
Geostationary orbit Earth science platform concepts for global change monitoring
p 3 N92-15471
Options in the global change fleet architecture provided by the presence of an EOS-A and -B
p 3 N92-15472

SPACECRAFT ORBITS

- Global change technology architecture trade study
[NASA-TM-104128] p 29 N92-15464
Hoop column soil moisture spacecraft in low Earth orbit for global change monitoring
p 3 N92-15470

SPACECRAFT PROPULSION

- Civil space technology initiative
p 1 N89-11761

SPACELAB

- Utilisation of Spacelab for remote sensing of Earth resources
p 19 N84-74448

SPATIAL RESOLUTION

- Characterizing user requirements for future land observing satellites
[NASA-TM-83867] p 6 N82-17562
Commercial applications multispectral sensor system
p 16 N93-25615
Detecting the scale and resolution effects in remote sensing and GIS
p 16 N93-25707

SPECTRAL BANDS

- Characterizing user requirements for future land observing satellites
[NASA-TM-83867] p 6 N82-17562

SPECTRAL RECONNAISSANCE

- The spot operational remote sensing satellite system: Current status and perspectives
p 8 N85-20776

SPECTROMETERS

- Selection of representative instruments for a global change technology architecture trade study
p 5 N92-15467

SPOT (FRENCH SATELLITE)

- The spot operational remote sensing satellite system: Current status and perspectives
p 8 N85-20776

STANDARDIZATION

- Data format standards for civilian remote sensing satellites
[PB93-192920] p 17 N94-21446

STATISTICAL ANALYSIS

- Statistical examination of climatological data relevant to global temperature variation
[DE91-007881] p 27 N91-19540

STRATEGY

- Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-101849] p 20 N90-70833

STRATOSPHERE

- Sixteenth International Laser Radar Conference, part 1
[AD-A277077] p 5 N92-29228
Radiative forcing of climate
p 33 N93-11094
Global temperature variations
p 45 N93-20068
Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO2 effects
[DE93-002347] p 37 N93-22972
Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry
[DE94-007846] p 40 N94-32817
Climate change and stratospheric ozone depletion: Need for more than the current minimalist response
p 41 N88-70502

STREAMS

- Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi
p 21 N94-71229

SUBDIVISIONS

- Earth observations and global change decision making: A special bibliography, 1991
[NASA-SP-7092] p 13 N91-30588

SUPERHIGH FREQUENCIES

- X-SAR: The X-band synthetic aperture radar on board the Space Shuttle
p 4 N94-15891

SUPPORT SYSTEMS

- Data policy and availability supporting global change research, development, and decision-making: An information perspective
[NASA-TM-105137] p 13 N91-30592

SURFACE PROPERTIES

- Science requirements for a global change technology architecture trade study
[NASA-TM-104082] p 45 N91-25558
Science requirements for a global change technology initiative architecture trade study
p 29 N92-15465

SURFACE ROUGHNESS

- Sudden climate change: The land surface record
[NASA-CR-191691] p 41 N93-71155

SURFACE TEMPERATURE

- Data sets and products
p 47 N86-16856
The uncertainties of global temperatures in the global warming context
[TABES PAPER 92-447] p 32 N92-32014
Lightning, atmospheric electricity, and climate change
[DE94-002003] p 46 N94-23471

SYNCHRONOUS PLATFORMS

- Need for expanded environmental measurement capabilities in geosynchronous Earth orbit
[NASA-CR-183487] p 29 N92-14490
Geostationary orbit Earth science platform concepts for global change monitoring
p 3 N92-15471

SYNTHETIC APERTURE RADAR

- Spaceborne SAR and sea ice
p 4 N84-16412
Development of a prototype spatial information processing system for hydrologic research
[NASA-CR-191224] p 14 N92-32590
X-SAR: The X-band synthetic aperture radar on board the Space Shuttle
p 4 N94-15891
EOS SAR: A new approach
p 4 N94-15904
Soil conservation applications with C-band SAR
p 48 N94-16760

- A comparative study of SAR data compression schemes
p 49 N94-28259
Insight to global change: EOS/SAR mission
[NASA-CR-196133] p 40 N94-35503

- Space Shuttle radar (SIR-A) views near-East volcanoes
[NASA-CR-175944] p 43 N85-73230
Processing and analysis evaluation of SAR-580 data and MOS-1 airborne verification data
[NASDA-CP-03-8] p 20 N90-70417

- Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877

- Physical and performance characteristics of instruments selected for global change monitoring
p 5 N92-15475

SYSTEMS ANALYSIS

- Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877

SYSTEMS ENGINEERING

- Physical and performance characteristics of instruments selected for global change monitoring
p 5 N92-15475

T

TABLES (DATA)

- Trends 1991: A compendium of data on global change
[DE92-011733] p 32 N92-31907

TECHNOLOGY ASSESSMENT

- Status and outlook for NASA's Land Remote Sensing Program
p 7 N83-17988
The role of lidars in global change research
p 31 N92-29235

- GIS: Geographic Information Systems. State of the art and future tendencies
[INPE-5358-NTC/301] p 51 N92-32227

- Small satellites and RPA's in global-change research
[AD-A260762] p 38 N93-25837
Data format standards for civilian remote sensing satellites
[PB93-192920] p 17 N94-21446

- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661

- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664

- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664

TECHNOLOGY TRANSFER

- Civil land remote sensing system
[GPO-87-070] p 7 N82-22630

- Research on enhancing the utilization of digital multispectral data and geographic information systems in global habitability studies
[NASA-CR-177294] p 10 N86-26669

- Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee
[DE92-014798] p 32 N92-31896

- Linking remote-sensing technology and global needs: A strategic vision
[NASA-TM-109214] p 20 N94-70142

- Program on stimulating operational private sector use of Earth observation satellite information
[E82-10131] p 7 N82-21660

- Appendix C. LANDSAT: A worldwide perspective
p 7 N83-10471

- GIS: Geographic Information Systems. State of the art and future tendencies
[INPE-5358-NTC/301] p 51 N92-32227

- The potential for the Department of Defense to use space-based remote sensing to support DOD and other government agencies' environmental programs
[AD-A273895] p 18 N94-25656

- Applications of Space-Age Technology in Anthropology
[NASA-TM-109395] p 49 N94-71223

- A comparative study of SAR data compression schemes
p 49 N94-28259

- Remote sensing for urban planning
p 18 N94-32465

- Remote sensing for urban planning
p 18 N94-32465

- Remote sensing for urban planning
p 18 N94-32465

- More sense for less cents: Cost effective servicing of remote sensing satellites
p 50 N94-11572

- Process thresholds: Report of Working Group Number 3
p 9 N85-32384

- Potential responses of landscape boundaries to global environmental change
[DE90-008568] p 26 N91-16451

- Design and development of the terrain information extraction system
[AD-A231166] p 13 N91-21623

- Role of landscape research in development of space methods for studying Earth
p 9 N86-14184

- Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] p 10 N86-17815

- Global change and the dark of the moon
[AD-A255181] p 52 N93-12380

- Conference on Using Next Generation Earth Observation Satellites: Summary handbook
p 7 N83-12508

- Second Eastern Regional Remote Sensing Applications Conference
[E83-10189] p 7 N83-19141

- Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] p 10 N86-17815

- Research, investigations and technical developments: National mapping program, 1983-1984
[PB86-166097] p 11 N86-26675

- Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments
p 43 N84-34864

TIDES

The effect of global change and long period tides on the Earth's rotation and gravitational potential

p 14 N92-26781

Sea level variation

p 47 N93-24929

TIME DEPENDENCE

Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments

p 43 N84-34864

TIME SERIES ANALYSIS

Statistical examination of climatological data relevant to global temperature variation

[DE91-007881]

p 27 N91-19540

TOPEX

Topex/Poseidon: A United States/France mission. Oceanography from space: The oceans and climate

[NASA-TM-108253]

p 3 N94-10699

Assessment of satellite earth observation programs

[NASA-CR-193279]

p 20 N93-72477

TOPOGRAPHY

Tenth Conference of Working Group of Socialist Countries on Remote Sensing of Earth under Intercosmos Program

[INPE-5203-PRE/1665]

p 9 N85-26820

Process thresholds: Report of Working Group Number 3

[INPE-5409-PRE/1756]

p 9 N85-32384

Potential responses of landscape boundaries to global environmental change

[DE90-008568]

p 26 N91-16451

Proposed methodology for the study of urban environment and space structure in metropolitan area

[INPE-5203-PRE/1665]

p 2 N91-21216

Updating topographic maps using orbital images in a microcomputer environment

[INPE-5409-PRE/1756]

p 15 N93-19739

TRACE ELEMENTS

Scientific linkages in global change

[PB90-112608]

p 23 N90-16356

International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 1

[DE92-013652]

p 33 N93-11232

International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 2

[DE92-013653]

p 33 N93-11233

TRANSPORTATION

Global warming: Transportation and energy considerations, 1990

[PB91-118919]

p 27 N91-20567

TRANSPORTATION ENERGY

Global warming: Transportation and energy considerations, 1990

[PB91-118919]

p 27 N91-20567

TREES (PLANTS)

A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program

[NASA-CR-179704]

p 11 N86-32828

TRENDS

Report of the International Ozone Trends Panel 1988, volume 2

[NASA-TM-105119]

p 29 N92-15457

Trends 1991: A compendium of data on global change

[DE92-011733]

p 32 N92-31907

TROPOSPHERE

The highlights of 1989

[NASA-TM-104985]

p 6 N91-24669

NASA/MSFC FY92 Earth Science and Applications Program Research Review

[NASA-CP-3184]

p 45 N93-20067

Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry

[DE94-007846]

p 40 N94-32817

U**U.S.S.R. SPACE PROGRAM**

Methods for complex space experiment in USSR for studying land from manned spacecraft

p 9 N86-14181

UNITED STATES

Second Eastern Regional Remote Sensing Applications Conference

[E83-10189]

p 7 N83-19141

Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data

[NASA-TM-85009]

p 50 N85-28877

Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 1

[PB90-171588]

p 24 N91-10394

Potential effects of global climate change on the United States. Appendix A: Water resources

[PB90-171968]

p 24 N91-10395

Potential effects of global climate change on the United States. Appendix B: Sea level rise

[PB90-172628]

p 24 N91-10396

Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 2

[PB90-171596]

p 24 N91-10397

Potential effects of global climate change on the United States. Appendix D: Forests

[PB90-173238]

p 24 N91-10398

Potential effects of global climate change on the United States. Appendix E: Aquatic resources

[PB90-172297]

p 25 N91-10399

Potential effects of global climate change on the United States. Appendix F: Air quality

[PB90-172230]

p 25 N91-10400

Potential effects of global climate change on the United States. Appendix G: Health

[PB90-173881]

p 25 N91-10401

Potential effects of global climate change on the United States. Appendix H: Infrastructure

[PB90-172313]

p 25 N91-10402

Potential effects of global climate change on the United States. Appendix I: Variability

[PB90-173899]

p 25 N91-10403

Potential effects of global climate change on the United States. Appendix J: Policy

[PB90-173188]

p 25 N91-10404

Limiting net greenhouse gas emissions in the United States

[DE92-007267]

p 30 N92-25313

Global Change Research Program: A component of the US Global Change Research Program. 1993 research opportunities

[NSF-92-77]

p 35 N93-18319

Economics and global change: The FY 1993 research program on the economics of global change. A supplement to the US President's FY 1993 budget and a companion document to out changing planet

[PB93-101244]

p 37 N93-21696

Landsat as a commercial enterprise

[INPE-5477-TAE/019]

p 16 N94-11524

UPPER ATMOSPHERE

Upper Atmosphere Research Satellite (UARS) trade analysis

[NASA-CR-175269]

p 2 N85-15774

UPPER ATMOSPHERE RESEARCH SATELLITE (UARS)

Assessment of satellite earth observation programs

[NASA-CR-193279]

p 20 N93-72477

URBAN PLANNING

Remote sensing for urban planning

p 18 N94-32465

USER MANUALS (COMPUTER PROGRAMS)

Global ecosystems database. Version 0.1 (beta-test).

EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Prototype 1: Database documentation. NGDC key to geophysical records documentation No. 25. User's manual

[PB92-122803]

p 30 N92-21439

Global ecosystems database. Version 1.0 (on CD-ROM).

EPA global climate research program. NOAA/NGDC global change database program. User's guide. Volume 1. NGDC key to geophysical records documentation No. 26

[PB93-146082]

p 37 N93-24334

Global ecosystems database. Version 1.0 (on CD-ROM).

EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27

[PB93-146090]

p 37 N93-24645

USER REQUIREMENTS

Characterizing user requirements for future land observing satellites

[NASA-TM-83867]

p 6 N82-17562

UTILITIES

Remote sensing for urban planning

p 18 N94-32465

V**VARIABILITY**

Potential effects of global climate change on the United States. Appendix I: Variability

[PB90-173899]

p 25 N91-10403

The uncertainties of global temperatures in the global warming context

[TABES PAPER 92-447]

p 32 N92-32014

VARIATIONS

Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2

[PB89-224943]

p 22 N90-12981

Global temperature variations

p 45 N93-20068

VEGETATION

Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3

[NASA-CR-179769]

p 11 N86-32863

Equilibrium-analysis of projected climate change effects on the global soil organic matter pool

[PB92-153022]

p 31 N92-26509

Global Change Data Base Pilot (Diskette) Project for Africa. Data base documentation version 1.1

[PB93-117927]

p 43 N93-21686

X-SAR: The X-band synthetic aperture radar on board the Space Shuttle

[DE91-017403]

p 28 N91-32587

Biophysical characterization and surface radiation balance

[NASA-CR-194659]

p 39 N94-17762

VEGETATION GROWTH

Carbon dioxide and climate: Summaries of research in FY 1989

[DE90-001791]

p 22 N90-14723

Modeling the response of plants and ecosystems to global change

[DE91-017403]

p 28 N91-32587

Driving terrestrial ecosystem models from space

[NASA-CR-4313]

p 44 N90-28310

VIDEO DATA

Size, duration, and rate of growth of nocturnal lightning events appearing on space shuttle video tapes

[NASA-CR-4313]

p 44 N90-28310

VOLCANOES

Sixteenth International Laser Radar Conference, part 1

[AD-A277077]

p 5 N92-29228

Space Shuttle radar (SIR-A) views near-East volcanoes

[NASA-CR-175944]

p 43 N85-73230

W**WATER COLOR**

Remote sensing and geographic informations systems: Implications for Global Marine Fisheries

[PB93-149409]

p 15 N93-24309

WATER DEPTH

Thermohaline circulations and global climate change

[DE93-004601]

p 36 N93-19505

WATER RESOURCES

Remote sensing training for Corps of Engineering personnel: The university training module concept

[NASA-CR-175204]

p 48 N84-20154

Potential effects of global climate change on the United States. Appendix A: Water resources

[PB90-171968]

p 24 N91-10395

Potential effects of global climate change on the United States. Appendix E: Aquatic resources

[PB90-172297]

p 25 N91-10399

Potential effects of global climate change on the United States. Appendix J: Policy

[PB90-173188]

p 25 N91-10404

WATER VAPOR

The detection of climate change due to the enhanced greenhouse effect

[NASA-TM-107965]

p 31 N92-31258

WEATHER

Sudden climate change: The land surface record

[NASA-CR-191691]

p 41 N93-71155

WEATHER FORECASTING

Research programs: Meteorological prediction. Oceanic processes. Climate and global change monitoring. Satellite instrumentation and calibration

[PB92-207125]

p 44 N90-25447

Application of optical remote sensing to the study of surface fluxes related to cloud formation

[DE93-003783]

p 45 N93-25125

Acquisition of satellite remote sensing data in the Meteorological Service

[NASA-CR-175204]

p 47 N85-74434

Linking remote-sensing technology and global needs: A strategic vision

[NASA-TM-109214]

p 20 N94-70142

WOOD

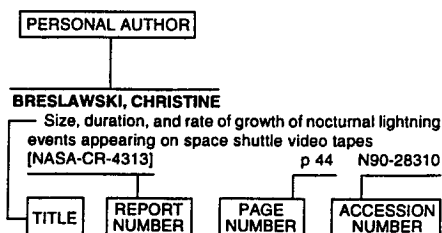
A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program

PERSONAL AUTHOR INDEX

REMOTE SENSING / GLOBAL CHANGE / A Special Bibliography

November 1994

Typical Personal Author Index Listing



Listings in this index are arranged alphabetically by personal author. The title of the document is used to provide a brief description of the subject matter. The report number helps to indicate the type of document (e.g., NASA report, translation, NASA contractor report). The page and accession numbers are located beneath and to the right of the title. Under any one author's name the accession numbers are arranged in sequence.

A

- ADAMS, JOHN**
Sudden climate change: The land surface record
[NASA-CR-191691] p 41 N93-71155
- ALEXANDER, TIMOTHY M.**
Remote sensing and the Mississippi high accuracy reference network p 19 N94-32466
- ALLEN, CHERYL L.**
Selection of representative instruments for a global change technology architecture trade study p 5 N92-15467
- Physical and performance characteristics of instruments selected for global change monitoring p 5 N92-15475
- ALLEN, M. R.**
Role of satellite observations of sea-surface temperature in the detection of global change
[PB94-138120] p 18 N94-29107
- ALVES, DIOGENES SALAS**
Analysis and modelling of spatial data proposal of a system for CBERS
[INPE-4911-PRE/1512] p 12 N90-21445
- AMBRUS, JUDITH H.**
Civil space technology initiative p 1 N89-11761
- ANDERSON, P. D.**
A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change
[DE92-019616] p 34 N93-12927
- ARNOLD, JAMES E.**
NASA/MSFC FY92 Earth Science and Applications Program Research Review
[NASA-CP-3184] p 45 N93-20067
- ARTHUR, B. E.**
A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872
- ARTIS, DONALD R., JR.**
The potential for the Department of Defense to use space-based remote sensing to support DOD and other government agencies' environmental programs
[AD-A273895] p 18 N94-25656
- ASHCRAFT, P.**
The Greenhouse Effect: Projections of global climate change p 41 N88-70493

- AUDET, H.**
Conference on Using Next Generation Earth Observation Satellites: Summary handbook p 7 N83-12508

B

- BALLARD, R. J.**
Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372
- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661
- Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662
- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664
- BANKS, P.**
Small satellites and RPAs in global-change research, summary and conclusions
[AD-A247855] p 3 N92-27388
- Small satellites and RPA's in global-change research
[AD-A260762] p 38 N93-25837
- BARKER, J. L.**
Characterizing user requirements for future land observing satellites
[NASA-TM-83867] p 6 N82-17562
- BARRON, ERIC J.**
The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018
- BARSKIY, N.**
Cosmonauts participate in multilevel remote sensing experiment p 9 N85-33130
- BATISTA, GETULIO**
The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018
- BAXTER, F. PAUL**
Information technology and global change science
[DE91-005020] p 26 N91-18492
- BAY, S. M.**
Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372
- Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373
- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661
- Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662
- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664
- BEDARD, D.**
Soil conservation applications with C-band SAR p 48 N94-16760
- BEIER, JOY**
Global change data sets: Excerpts from the Master Directory, version 2.0
[NASA-TM-107994] p 33 N92-34028
- BELTRAN, G. N.**
Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877
- BESSON, O.**
A comparative study of SAR data compression schemes p 49 N94-28259
- BIRK, RONALD J.**
Commercial applications multispectral sensor system p 16 N93-25615
- BIRKS, JOHN W.**
Chemistry of the atmosphere: Its impact on global change. CHEMRAWN 7: Perspectives and recommendations
[PB93-180644] p 48 N93-29670
- BISHOP, PETER C.**
Earth view: A business guide to orbital remote sensing
[NASA-CR-188238] p 13 N91-24671
- BLACKFORD, E.**
Space Shuttle radar (SIR-A) views near-East volcanoes
[NASA-CR-175944] p 43 N85-73230
- BLAD, BLAINE L.**
Biophysical characterization and surface radiation balance
[NASA-CR-194659] p 39 N94-17762
- BLADOS, WALTER R.**
Global change information support: A north-south coalition
[NASA-TM-108983] p 36 N93-19940
- BLOYD, C. N.**
US energy use: New technologies and policies in response to global warming
[DE90-002170] p 22 N90-14724
- BLUESTEIN, H.**
Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments p 43 N84-34864
- BOARDMAN, JOE W.**
Discrimination among semi-arid landscape endmembers using the Spectral Angle Mapper (SAM) algorithm p 17 N94-16711
- BODEN, T. A.**
Trends 1991: A compendium of data on global change
[DE92-011733] p 32 N92-31907
- BODEN, THOMAS A.**
TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632
- Trends '91: A compendium of data on global change. Highlights
[DE93-003112] p 38 N93-25144
- BOLSTAD, PAUL VICTOR**
The integration of remote sensing, geographic information system, and expert system technologies for landcover classification p 49 N91-23733
- BORZA, KAREN**
Global change and biodiversity loss: Some impediments to response p 27 N91-22622
- BRACHET, G.**
The spot operational remote sensing satellite system: Current status and perspectives p 8 N85-20776
- BRADLEY, R. A.**
Limiting net greenhouse gas emissions in the United States
[DE92-007267] p 30 N92-25313
- BREAULT, ROBERT P.**
Analysis of LARI sensor system
[DE93-006334] p 37 N93-24977
- BRESLAWSKI, CHRISTINE**
Size, duration, and rate of growth of nocturnal lightning events appearing on space shuttle video tapes
[NASA-CR-4313] p 44 N90-28310
- BREWER, PETER**
The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018
- BRISCO, B.**
Soil conservation applications with C-band SAR p 48 N94-16760

BRITO, JORGE LUIS SILVA

Estimations of temperature and humidity of the canopy in Amazon Forest using microwave data from SMMR sensor of Nimbus-7 satellite
[INPE-5444-TDI/490] p 46 N94-13614

BRODERICK, P. W.

Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877

BROOKER, WILLIAM G.

An assessment of information demands for remote sensing and Geographic Information System technologies
[PB89-159313] p 12 N89-27233

BROWN, R. J.

Soil conservation applications with C-band SAR
p 48 N94-16760

BRUEGGEMANN, W.

Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881

BUGLIA, JAMES J.

Satellite orbit considerations for a global change technology architecture trade study
[NASA-TM-104081] p 44 N91-25557

Satellite orbit considerations for a global change technology architecture trade study p 1 N92-15466

BURGESS, BRYAN

Remote sensing for urban planning
p 18 N94-32465

BURROWBRIDGE, DONALD R., JR.

Sunsynchronous low Earth orbit spacecraft concepts and technology requirements for global change monitoring p 2 N92-15469

BURTIS, M. D.

Selected translated abstracts of Russian-language climate-change publications. 2: Clouds
[DE94-011465] p 47 N94-36244

BURTON, IAN

Human dimensions of global change: Toward a research agenda p 29 N92-10238

BUSCH, J.

Incorporating global warming risks in power sector planning. Volume 1: A case study of the New England region
[DE93-015241] p 39 N94-17289

BUTERA, K. M.

NASA's land remote sensing plans for the 1980's
p 8 N85-23224

BUTTERFIELD, ANSEL J.

Sunsynchronous low Earth orbit spacecraft concepts and technology requirements for global change monitoring p 2 N92-15469

BYERLY, RADFORD, JR.

Research in geosciences policy
[NASA-CR-188038] p 27 N91-22619

C**CALVERT, JACK G.**

Chemistry of the atmosphere: Its impact on global change. CHEMRAWN 7: Perspectives and recommendations
[PB93-180644] p 48 N93-29670

CAMPBELL, THOMAS G.

Science requirements for a global change technology architecture trade study
[NASA-TM-104082] p 45 N91-25558

Science requirements for a global change technology initiative architecture trade study p 29 N92-15465

Microwave sensing technology issues related to a global change technology architecture trade study p 14 N92-15468

Geostationary orbit Earth science platform concepts for global change monitoring p 3 N92-15471

CAMPBELL, W. G.

Global ecosystems database. Version 0.1 (beta-test). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Prototype 1: Database documentation. NGDC key to geophysical records documentation No. 25. User's manual
[PB92-122803] p 30 N92-21439

CAO, CHANGYONG

Detecting the scale and resolution effects in remote sensing and GIS p 16 N93-25707

CARROLL, BONNIE C.

Data policy and availability supporting global change research, development, and decision-making: An information perspective
[NASA-TM-105137] p 13 N91-30592

CHAO, TIEN-HSIN

JPL activities on development of acousto-optic tunable filter imaging spectrometer p 5 N94-16696

CHENG, LI-JEN

JPL activities on development of acousto-optic tunable filter imaging spectrometer p 5 N94-16696

CHRISTY, JOHN R.

The uncertainties of global temperatures in the global warming context
[TABES PAPER 92-447] p 32 N92-32014

Global temperature variations p 45 N93-20068

COLWELL, J. E.

A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
[NASA-CR-179704] p 11 N86-32828

CONNOLLY, DENIS

Microwave sensing technology issues related to a global change technology architecture trade study p 14 N92-15468

COOPER, CHESTER L.

Epilogue p 29 N92-10240

COOTER, ELLEN J.

General circulation model output for forest climate change research and applications
[PB93-124626] p 37 N93-24015

CORNWALL, J.

Small satellites and RPA's in global-change research
[AD-A260762] p 38 N93-25837

CORNWALL, J. M.

Small satellites and RPAs in global-change research, summary and conclusions
[AD-A247855] p 3 N92-27388

COTTER, GLADYS A.

Data policy and availability supporting global change research, development, and decision-making: An information perspective
[NASA-TM-105137] p 13 N91-30592

Global change information support: A north-south coalition
[NASA-TM-108983] p 36 N93-19940

COWEN, DAVE J.

Remote sensing for urban planning
p 18 N94-32465

CRESSY, P. J.

Characterizing user requirements for future land observing satellites
[NASA-TM-83867] p 6 N82-17562

CROSSON, PIERRE R.

Climate change: Problems of limits and policy responses p 28 N92-10232

CUBASCH, U.

Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881

CUSHMAN, ROBERT M.

Global climate change and NEPA (National Environmental Policy Act) analyses
[DE90-003704] p 22 N90-15540

CUTTS, JAMES A.

Sensors research and technology p 1 N89-11774

D**DAILY, GRETCHEN C.**

Global change and carrying capacity: Implications for life on Earth p 26 N91-17454

DALEY, C.

Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981

DALGE, JULIA CESAR LIMA

Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739

DAVIS, BRUCE A.

Remote sensing for urban planning
p 18 N94-32465

DAVIS, BRUCE E.

Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms p 2 N91-28079

DAVIS, P.

A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872

DAVIS, WILLIAM T.

Geostationary orbit Earth science platform concepts for global change monitoring p 3 N92-15471

DEFRIES, RUTH S.

Global Change and Our Common Future. Papers from a Forum
[LC-89-62950] p 26 N91-17453

DELGENIO, ANTHONY

Accuracy requirements p 46 N94-21642

DENEGRE, J.

Space imagery processing: Methods and applications at the I.G.N.-France p 19 N83-70161

DESMOND, GREGORY B.

Design and development of the terrain information extraction system
[AD-A231166] p 13 N91-21623

DLAZ, H. F.

Reconstruction of spatial patterns of climatic anomalies during the medieval warm period (AD 900-1300)
[DE94-006637] p 47 N94-72025

DING, M.

Radiative forcing of climate p 33 N93-11094

DOUGLAS, BRUCE C.

Sea level variation p 47 N93-24929

DOVIK, R. J.

Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments
p 43 N84-34864

DOZIER, JEFF

The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018

DUBOIS, PASCALE

Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data
p 51 N93-25798

Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data
p 52 N93-29234

DYSON, F.

Small satellites and RPAs in global-change research, summary and conclusions
[AD-A247855] p 3 N92-27388

Small satellites and RPA's in global-change research
[AD-A260762] p 38 N93-25837

E**EASTWOOD, L. F., JR.**

Program on stimulating operational private sector use of Earth observation satellite information
[E82-10131] p 7 N82-21660

Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372

Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661

Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664

ECK, T. F.

Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon p 17 N94-20961

EDER, BRIAN K.

General circulation model output for forest climate change research and applications
[PB93-124626] p 37 N93-24015

EDMONDS, JAE A.

Radiative forcing of climate p 33 N93-11094

EDWARDS, DANIEL L.

Design and development of the terrain information extraction system
[AD-A231166] p 13 N91-21623

EHRlich, ANNE H.

Global change and carrying capacity: Implications for life on Earth p 26 N91-17454

EHRlich, DANIELE

Multi-temporal satellite image analysis for crop inventories in the Po River Valley (Italy)
p 15 N93-25434

EHRlich, PAUL R.

Global change and carrying capacity: Implications for life on Earth p 26 N91-17454

ELLINGSON, R. G.

Atmospheric radiation measurement: A program for improving radiative forcing and feedback in general circulation models
[DE92-014263] p 43 N93-70092

ELLIOT, GREGORY

Jackson State University's Center for Spatial Data Research and Applications: New facilities and new paradigms p 2 N91-28079

ENGI, DENNIS

A qualitative architecture for understanding policy responses to global change
[DE90-003936] p 23 N90-16364

ERICKSON, L. W.

A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872

ESTES, J. E.

Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3
[NASA-CR-179769] p 11 N86-32863

ESTES, JOHN E.

Remote sensing information sciences research group
[NASA-CR-183374] p 11 N89-14481
Remote sensing information sciences research group: Browse in the EOS era
[NASA-CR-184637] p 11 N89-22979

EVANS, ROBERT H.

Remote Earth Sciences data collection using ACTS
[NASA-CR-195227] p 18 N94-26236

F**FAIRCHILD, P. D.**

Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO₂ effects
[DE93-002347] p 37 N93-22972

FALCONER, ALLAN

Mapping Tomorrow's Resources: A symposium on the uses of remote sensing, Geographic Information Systems (GIS), and Global Positioning Systems (GPS) for natural resources management p 17 N94-24357

FAN, Y. A.

Preliminary study of LANDSAT imageries of Taiwan and its surroundings p 8 N84-35050

FARMER, JEFFERY T.

Geostationary orbit Earth science platform concepts for global change monitoring p 3 N92-15471

FARRELL, MICHAEL

TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632

FEARNSIDE, PHILIP M.

Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092

FELDMAN, D. L.

Iterative functionalism and climate management regimes: From intergovernmental panel on climate change to intergovernmental negotiating committee
[DE92-014798] p 32 N92-31896

FEREBEE, MELVIN J., JR.

Hoop column soil moisture spacecraft in low Earth orbit for global change monitoring p 3 N92-15470

FERNANDEZ, R. NORBERTO

NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438

FERRALL, C.

Space Shuttle radar (SIR-A) views near-East volcanoes
[NASA-CR-175944] p 43 N85-73230

FISCHER, S. K.

Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO₂ effects
[DE93-002347] p 37 N93-22972

FLATTE, S.

Global change and the dark of the moon
[AD-A255181] p 52 N93-12380

FLOYD, C. L.

What's past is prologue: Supporting global change research with historical data
[DE93-005777] p 38 N93-30009

FOERNSLER, LYNDIA

Plots of ground coverage achievable by global change monitoring instruments and spacecraft p 14 N92-15476

FORESTI, CELINA

Proposed methodology for the study of urban environment and space structure in metropolitan area
[INPE-5203-PRE/1665] p 2 N91-21216

FORTSON, N.

Small satellites and RPAs in global-change research, summary and conclusions
[AD-A247855] p 3 N92-27388
Small satellites and RPA's in global-change research
[AD-A260762] p 38 N93-25837

FOSHAGE, J.

Program on stimulating operational private sector use of Earth observation satellite information
[E82-10131] p 7 N82-21660

FOUTCH, T. K.

Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372

Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661

Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664

FOX, M. M.

Upper Atmosphere Research Satellite (UARS) trade analysis
[NASA-CR-175269] p 2 N85-15774

FRAU, ALEJANDRO CONTRERAS

Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739

FREDERICK, JOHN E.

The detection and interpretation of long-term changes in ozone from space
[NASA-TM-101135] p 21 N88-27650

FREEMAN, ANTHONY

Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data
p 51 N93-25798

Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data
p 52 N93-29234

FULK, MICHELLE

Global change data base training exercise manual. Exploring Earth's environment: Africa as an example
[PB92-224682] p 36 N93-21211

FULKERSON, W.

The dilemma of fossil fuel use and global climate change
[DE91-007859] p 27 N91-19533

FUNG, I.

The Greenhouse Effect: Projections of global climate change
p 41 N88-70493

G**GADDIS, L.**

Space Shuttle radar (SIR-A) views near-East volcanoes
[NASA-CR-175944] p 43 N85-73230

GARDNER, ROBERT H.

Potential responses of landscape boundaries to global environmental change
[DE90-008568] p 26 N91-16451

GARMAN, T. R.

Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877

GARN, PAUL A.

Sunsynchronous low Earth orbit spacecraft concepts and technology requirements for global change monitoring
p 2 N92-15469

Geostationary orbit Earth science platform concepts for global change monitoring
p 3 N92-15471

GARRETT, L. BERNARD

Global change technology architecture trade study
[NASA-TM-104128] p 29 N92-15464

Sunsynchronous low Earth orbit spacecraft concepts and technology requirements for global change monitoring
p 2 N92-15469

GARWIN, R.

Small satellites and RPA's in global-change research
[AD-A260762] p 38 N93-25837

GERY, M. W.

Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981

GIBSON, GARY G.

Satellite orbit considerations for a global change technology architecture trade study
[NASA-TM-104081] p 44 N91-25557

Science requirements for a global change technology architecture trade study
[NASA-TM-104082] p 45 N91-25558

Science requirements for a global change technology initiative architecture trade study
p 29 N92-15465

Satellite orbit considerations for a global change technology architecture trade study
p 1 N92-15466

GILLESPIE, ALAN

Sudden climate change: The land surface record
[NASA-CR-191691] p 41 N93-71155

GLUSHKO, Y. V.

Role of landscape research in development of space methods for studying Earth p 9 N86-14184

GOETZ, ALEXANDER F. H.

Discrimination among semi-arid landscape endmembers using the Spectral Angle Mapper (SAM) algorithm
p 17 N94-16711

GOHAGAN, J. K.

Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372

Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661

Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664

GOMEZ, G.

Program on stimulating operational private sector use of Earth observation satellite information
[E82-10131] p 7 N82-21660

GRANT, K. E.

Sensitivity of direct global warming potentials to key uncertainties
[DE92-041045] p 35 N93-16298

GRAY, H. L.

Statistical examination of climatological data relevant to global temperature variation
[DE91-007881] p 27 N91-19540

GRAZIANI, M. E.

Geographic research in the US Geological Survey: Bibliography, 1966 - 1980
[USGS-CIRC-865] p 42 N83-11639

GREENFIELD, S. M.

Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981

GRIN, A. M.

Soviet participation in FIFE-1989 remote sensing study
p 13 N91-30173

GROSE, WILLIAM

The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018

GUNST, R. F.

Statistical examination of climatological data relevant to global temperature variation
[DE91-007881] p 27 N91-19540

H**HALLS, JOANNE**

Remote sensing for urban planning
p 18 N94-32465

HAMPTON, G.

A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872

HANSEN, J.

The Greenhouse Effect: Projections of global climate change
p 41 N88-70493

HANSEN, JAMES

Climate forcings and feedbacks
p 46 N94-21641

HANSON, H. P.

Thermohaline circulations and global climate change
[DE91-007458] p 27 N91-19537

Thermohaline circulations and global climate change
[DE93-004601] p 36 N93-19505

HARLEY, P.

Modeling the response of plants and ecosystems to global change
[DE91-017403] p 28 N91-32587

HARRIS, GRAHAM

The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018

HARRISON, EDWIN F.

Satellite orbit considerations for a global change technology architecture trade study
[NASA-TM-104081] p 44 N91-25557

Science requirements for a global change technology architecture trade study
[NASA-TM-104082] p 45 N91-25558

- Science requirements for a global change technology initiative architecture trade study p 29 N92-15465
Satellite orbit considerations for a global change technology architecture trade study p 1 N92-15466

HARTMANN, DENNIS

- The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018

HASSELMANN, K.

- Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881

HASTINGS, DAVID

- Global change data base training exercise manual. Exploring Earth's environment: Africa as an example
[PB92-224682] p 36 N93-21211

HAYS, CYNTHIA J.

- Biophysical characterization and surface radiation balance
[NASA-CR-194659] p 39 N94-17762

HAYS, T. R.

- Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372

- Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373

- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661

- Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662

- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664

HEAVENRICH, ROBERT M.

- Options for controlling the global warming impact from motor vehicles
[PB90-161688] p 23 N90-28142

HELLMAN, KARL H.

- Options for controlling the global warming impact from motor vehicles
[PB90-161688] p 23 N90-28142

HERBERT, J. J.

- Technology needs of advanced Earth observation spacecraft
[NASA-CR-3698] p 2 N84-17248

HEYMAN, P. J.

- Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877

HIGG, H. C.

- NASA's land remote sensing plans for the 1980's
p 8 N85-23224

HILBERT, D. W.

- Modeling the response of plants and ecosystems to global change
[DE91-017403] p 28 N91-32587

HILL, C. T.

- Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372

- Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373

- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661

- Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662

- Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664

HILLAND, J. E.

- Data sets and products
p 47 N86-16856

HILLSMAN, E. L.

- Global warming: Transportation and energy considerations, 1990
[PB91-118919] p 27 N91-20567

HILSENATH, ERNEST

- The detection and interpretation of long-term changes in ozone from space
[NASA-TM-101135] p 21 N88-27650

HOECK, H.

- Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881

HOELL, JAMES M., JR.

- Applications of ISES for the atmospheric sciences
p 42 N90-27155

HOEFFERT, M. I.

- The role of clouds and oceans in global greenhouse warming
[DE93-016206] p 38 N94-13079

HOLBEN, BRENT N.

- Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon
p 17 N94-20961

HONEA, R. B.

- What's past is prologue: Supporting global change research with historical data
[DE93-005777] p 38 N93-30009

HOOD, VALERIE ANNE

- International cooperation in remote sensing: The ESA experience
p 52 N88-24038

HOOKER, L. K.

- Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877

HUGHES, M. K.

- Reconstruction of spatial patterns of climatic anomalies during the medieval warm period (AD 900-1300)
[DE94-006637] p 47 N94-72025

HUGHES, P. J.

- Global warming impacts of CFC alternative technologies: Combining fluorocarbon and CO₂ effects
[DE93-002347] p 37 N93-22972

HUNSAKER, DONALD B., JR.

- Global climate change and NEPA (National Environmental Policy Act) analyses
[DE90-003704] p 22 N90-15540

HUNTLEY, JACK E.

- Global Climate Change (GCC) issues and their impacts on the US Army Corps of Engineers
[AD-A247279] p 34 N93-11466

HYPES, WARREN D.

- Global change technology architecture trade study
[NASA-TM-104128] p 29 N92-15464

- Selection of representative instruments for a global change technology architecture trade study
p 5 N92-15467

- Options in the global change fleet architecture provided by the presence of an EOS-A and -B
p 3 N92-15472

I**IMHOFF, M. L.**

- Second Eastern Regional Remote Sensing Applications Conference
[E83-10189] p 7 N83-19141

IRWIN, N. A.

- Global warming: Transportation and energy considerations, 1990
[PB91-118919] p 27 N91-20567

ISMAILOV, T.

- Azerbaijan Institute develops subsatellite measurement systems
p 8 N84-31238

J**JACK, ROBERT F.**

- Data policy and availability supporting global change research, development, and decision-making: An information perspective
[NASA-TM-105137] p 13 N91-30592

JACKSON, CHERYL C.

- Geostationary orbit Earth science platform concepts for global change monitoring
p 3 N92-15471

JAIN, A. K.

- Sensitivity of direct global warming potentials to key uncertainties
[DE92-041045] p 35 N93-16298

JALINK, ANTHONY

- Selection of representative instruments for a global change technology architecture trade study
p 5 N92-15467

JAMIESON, DALE

- Global change and biodiversity loss: Some impediments to response
p 27 N91-22622

JANETOS, ANTHONY C.

- Scientific linkages in global change
[PB90-112608] p 23 N90-16356

JENSEN, JOHN R.

- Remote sensing for urban planning
p 18 N94-32465

JOHANNSEN, CHRIS J.

- NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438

JOHNSON, JAY K.

- Settlement patterns, GIS, remote sensing, and the late prehistory of the Black Prairie in east central Mississippi
p 21 N94-71229

JOHNSON, W. F.

- Global warming: Transportation and energy considerations, 1990
[PB91-118919] p 27 N91-20567

JUDKINS, R. R.

- The dilemma of fossil fuel use and global climate change
[DE91-007859] p 27 N91-19533

JUTRO, PETER R.

- Scientific linkages in global change
[PB90-112608] p 23 N90-16356

K**KANCIRUK, PAUL**

- TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632

KANE, ROBERT

- Global climate change: A fossil energy perspective
[DE90-003770] p 23 N90-15541

KAPITONOVA, N. V.

- Use of a priori evaluation of conditions for observing Earth's surface from space for effective choice of time for executing survey
p 10 N86-20260

KAUFMAN, Y. A.

- Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon
p 17 N94-20961

KEAFER, LLOYD

- Selection of representative instruments for a global change technology architecture trade study
p 5 N92-15467

KEMP, P. R.

- Modeling the response of plants and ecosystems to global change
[DE91-017403] p 28 N91-32587

KENSKI, D. M.

- US energy use: New technologies and policies in response to global warming
[DE90-002170] p 22 N90-14724

KERCHER, J. R.

- A computer simulation of ecosystem processes in forests for application to air pollution, acid precipitation, and global change
[DE92-019616] p 34 N93-12927

KINEMAN, J. J.

- Global ecosystems database. Version 0.1 (beta-test). EPA Global Climate Research Program. NOAA/NGDC Global Change Database Program. Prototype 1: Database documentation. NGDC key to geophysical records documentation No. 25. User's manual
[PB92-122803] p 30 N92-21439

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. User's guide. Volume 1. NGDC key to geophysical records documentation No. 26
[PB93-146082] p 37 N93-24334

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual. DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27
[PB93-146090] p 37 N93-24645

- Global change and the dark of the moon
[AD-A255181] p 52 N93-12380
- KOZODEROV, V. V.**
Soviet participation in FIFE-1989 remote sensing study
p 13 N91-30173
- KRAUSE, F.**
Incorporating global warming risks in power sector planning. Volume 1: A case study of the New England region
[DE93-015241] p 39 N94-17289
- KUGELMANN, D.**
Second Eastern Regional Remote Sensing Applications Conference
[E83-10189] p 7 N83-19141
- KUX, HERMANN JOHANN HEINRICH**
GIS: Geographic Information Systems. State of the art and future tendencies
[INPE-5358-NTC/301] p 51 N92-32227
- L**
- LABOVITZ, M. L.**
Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877
- LACIS, A.**
The Greenhouse Effect: Projections of global climate change
p 41 N88-70493
- LAMBERT-NEBOUT, C.**
A comparative study of SAR data compression schemes
p 49 N94-28259
- LASHOF, DANIEL A.**
Policy options for stabilizing global climate. Volume 1: Chapters 1-6
[PB90-182304] p 23 N90-28146
- LAU, WILLIAM**
The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018
- LEBEDEFF, S.**
The Greenhouse Effect: Projections of global climate change
p 41 N88-70493
- LEBERL, FRANZ**
Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data
p 51 N93-25798
Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data
p 52 N93-28234
- LEDUC, SHARON K.**
General circulation model output for forest climate change research and applications
[PB93-124626] p 37 N93-24015
- LEE, DAVID CHUNG LIANG**
Multisensor remote sensing data and GIS techniques for monitoring preservation areas: A case study
[INPE-5317-PRE/1714] p 16 N94-14131
- LEE, JEANNIE**
More sense for less cents: Cost effective servicing of remote sensing satellites
p 50 N94-11572
- LEEMANS, R.**
Equilibrium-analysis of projected climate change effects on the global soil organic matter pool
[PB92-153022] p 31 N92-26509
- LELIEVELD, JOSEPH**
Radiative forcing of climate
p 33 N93-11094
- LEMARSHALL, JOHN**
The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018
- LEMOS, MARIA CARMEN DEMELLO**
Landsat as a commercial enterprise
[INPE-5477-TAE/019] p 16 N94-11524
- LEOVY, CONWAY**
Radiative forcing of climate
p 33 N93-11094
- LESLIE, FRED W.**
NASA/MSFC FY92 Earth Science and Applications Program Research Review
[NASA-CP-3184] p 45 N93-20067
- LIU, M. K.**
Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981
- LIVERMAN, DIANA M.**
Climate and society in 20th century Mexico
p 45 N91-27600
- LOCKYER, PAUL**
Mission planning for an Earth observation low Earth orbiter: ERS-1
p 50 N94-23868
- LONGSTRETH, J.**
Health effects of global warming: Problems in assessment
[DE93-040323] p 39 N94-19930
- LOUSMA, JACK R.**
Earth science information: Planning for the integration and use of global change information
[NASA-CR-191217] p 51 N93-12660
Earth science information: Planning for the integration and use of global change information
[NASA-CR-191208] p 51 N93-12680
- LOZANO-GARCIA, D. FABIAN**
NASA applications project in Miami County, Indiana
[NASA-CR-187916] p 12 N91-17438
- LUDWIG, R. W.**
Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877
- LUKASHCHEVICH, Y. L.**
Use of a priori evaluation of conditions for observing Earth's surface from space for effective choice of time for executing survey
p 10 N86-20260
- LUMMAUX, J. C.**
Space imagery processing: Methods and applications at the I.G.N.-France
p 19 N83-70161
- M**
- MACCRACKEN, MICHAEL C.**
Climate projections with regional resolution
[DE90-000858] p 22 N90-14715
- MACDONALD, G.**
Global change and the dark of the moon
[AD-A255181] p 52 N93-12380
- MAEDA, KOREHIRO**
Processing and analysis evaluation of SAR-580 data and MOS-1 airborne verification data
[NASA-CP-03-8] p 20 N90-70417
- MAIER-REIMER, E.**
Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881
- MAKIN, K. P.**
Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661
Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662
Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664
- MAKUNDI, WILLY**
Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092
- MALONE, THOMAS F.**
Global Change and Our Common Future. Papers from a Forum
[LC-89-62950] p 26 N91-17453
- MARLAND, G.**
Global climate change: Some implications, opportunities, and challenges for US forestry
[DE92-040874] p 35 N93-17209
- MARTINKO, E. A.**
Research on enhancing the utilization of digital multispectral data and geographic information systems in global habitability studies
[NASA-CR-177294] p 10 N86-26669
- MASSONNET, D.**
A comparative study of SAR data compression schemes
p 49 N94-28259
- MASUOKA, E. J.**
Experimental philosophy leading to a small scale digital data base of the conterminous United States for designing experiments with remotely sensed data
[NASA-TM-85009] p 50 N85-28877
- MATSON, PAMELA**
Global change and carrying capacity: Implications for life on Earth
p 26 N91-17454
- MAUGHAN, PAUL M.**
An assessment of information demands for remote sensing and Geographic Information System technologies
[PB89-159313] p 12 N89-27233
- MCCORMICK, M. PATRICK**
Sixteenth International Laser Radar Conference, part 1
[AD-A277077] p 5 N92-29228
Radiative forcing of climate
p 33 N93-11094
- MCDONALD, KYLE C.**
A summary of microwave remote sensing investigations planned for BOREAS
p 17 N94-15914
- MCDONNELL, MICHAEL**
Scan-line methods in spatial data systems
[AD-A231165] p 50 N91-21973
- MCLEROY, M.**
Global Change: A Biogeochemical Perspective
[NASA-CR-173210] p 21 N84-16656
- MCEWEN, R. B.**
Research, investigations and technical developments: National mapping program, 1983-1984
[PB86-166097] p 11 N86-26675
- MCVEY, SALLY**
Research in geosciences policy
[NASA-CR-188038] p 27 N91-22619
A remote sensing applications update: Results of interviews with Earth Observations Commercialization Program (EOCAP) participants
p 28 N91-22623
- MERCANTI, ENRICO P.**
Need for expanded environmental measurement capabilities in geosynchronous Earth orbit
[NASA-CR-183487] p 29 N92-14490
- MERCHANT, J. W.**
Research on enhancing the utilization of digital multispectral data and geographic information systems in global habitability studies
[NASA-CR-177294] p 10 N86-26669
- MESARCH, MARK A.**
Biophysical characterization and surface radiation balance
[NASA-CR-194659] p 39 N94-17762
- MICK, MARK**
Remote sensing and the Mississippi high accuracy reference network
p 19 N94-32466
- MIKOLAJEWICZ, U.**
Ocean variability and its influence on the detectability of greenhouse warming signals
[DE94-008670] p 48 N94-32881
- MISENICK, TOM**
More sense for less cents: Cost effective servicing of remote sensing satellites
p 50 N94-11572
- MISHEV, D.**
Contribution to space program reviewed
p 1 N85-26834
- MITSUO, FERNANDO AUGUSTA, II**
Analysis and modelling of spatial data proposal of a system for CBERS
[INPE-4911-PRE/1512] p 12 N90-21445
- MODESTODESOUZA, RICARDO CARTAXO**
Analysis and modelling of spatial data proposal of a system for CBERS
[INPE-4911-PRE/1512] p 12 N90-21445
- MOORE, BERRIEN, III**
Payload advisory panel recommendations
[NASA-TM-108012] p 1 N93-11528
The Payload Advisory Panel and the Data and Information System Advisory Panel of the Investigators Working Group of the Earth Observing System: A joint report
[NASA-TM-109847] p 19 N94-34018
- MOORE, G. E.**
Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981
- MORGAN, R. P.**
Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175990] p 19 N85-73372
Program on Earth Observation Data Management Systems (EODMS)
[NASA-CR-175993] p 19 N85-73373
Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2
[NASA-CR-175973] p 20 N85-73661
Program on Earth Observation Data Management Systems, preliminary needs analysis report
[NASA-CR-175981] p 20 N85-73662
Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3
[NASA-CR-175991] p 20 N85-73664
- MORREN, GEORGE E. B., JR.**
New technology and regional studies in human ecology: A Papua New Guinea example
p 42 N94-71231
- MORRIS, R. E.**
Sensitivity of a regional oxidant model to variations in climate parameters, volume 1 and 2
[PB89-224943] p 22 N90-12981
- MOUGINIS-MARK, P.**
Space Shuttle radar (SIR-A) views near-East volcanoes
[NASA-CR-175944] p 43 N85-73230

MURRAY, NICHOLAS D.

Information data systems for a global change technology initiative architecture trade study p 51 N92-15473

MURRELL, J. D.

Options for controlling the global warming impact from motor vehicles [PB90-161688] p 23 N90-28142

N

NARUMALANI, SUNIL

Remote sensing for urban planning p 18 N94-32465

NAUNHEIMER, J.

Soil conservation applications with C-band SAR p 48 N94-16760

NEANDER, JOHN E.

Global Climate Change (GCC) issues and their impacts on the US Army Corps of Engineers [AD-A247279] p 34 N93-11466

NEBB, J.

Upper Atmosphere Research Satellite (UARS) trade analysis [NASA-CR-175269] p 2 N85-15774

NELEPO, B.

Nelepo describes Intercosmos-Black Sea experiment p 47 N84-18257

NELSON, M.

Exploring global change: The benefits and disadvantages of microsatellite, lightsatellite, and megasatellite architectures [DE92-009513] p 41 N92-70838

NETO, GILBERTO CAMARA

Analysis and modelling of spatial data proposal of a system for CBERS [INPE-4911-PRE/1512] p 12 N90-21445

NITZE, W. A.

The uses and limits of economic models as a climate change policy tool [DE92-015792] p 34 N93-12474

NIU, XUFENG

The detection and interpretation of long-term changes in ozone from space [NASA-TM-101135] p 21 N88-27650

NJOKU, E. G.

Data sets and products p 47 N86-16856

NORIKANE, L.

Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data p 52 N93-29234

O

OGLESBY, R. J.

Sensitivity of climate models: Comparison of simulated and observed patterns for past climates [DE92-002820] p 30 N92-16503

OHRENSCHALL, M. A.

Global ecosystems database. Version 1.0 (on CD-ROM). EPA global climate research program. NOAA/NGDC global change database program. Documentation manual, DISC-A. Volume 1. NGDC key to geophysical records documentation No. 27 [PB93-146090] p 37 N93-24645

ONEILL, R. V.

Hierarchy theory and global change [DE86-005154] p 44 N86-31190

ONEILL, ROBERT V.

Potential responses of landscape boundaries to global environmental change [DE90-008568] p 26 N91-16451

OSNER, G. T.

Program on Earth Observation Data Management Systems (EODMS) [NASA-CR-175993] p 19 N85-73373

P

PANNETT, R. A.

Acquisition of satellite remote sensing data in the Meteorological Service p 47 N85-74434

PARADA, N. D. J.

Brazilian Remote Sensing Shuttle Experiment (BRESEX): Characteristics and future utilization on satellites [INPE-3313-PRE/620] p 5 N85-19385

PATRINOS, A. A.

Atmospheric radiation measurement: A program for improving radiative forcing and feedback in general circulation models [DE92-014263] p 43 N93-70092

PATTEN, K. O.

Sensitivity of global warming potentials to the assumed background atmosphere [DE92-011072] p 31 N92-27417

Sensitivity of direct global warming potentials to key uncertainties [DE92-041045] p 35 N93-16298

Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry [DE94-007846] p 40 N94-32817

PEPLIES, R. W.

What's past is prologue: Supporting global change research with historical data [DE93-005777] p 38 N93-30009

PEREIRA, ALFREDO

Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon p 17 N94-20961

PERKEY, DONALD J.

Global change research related to the Earth's energy and hydrologic cycle [NASA-CR-195270] p 40 N94-27430

PEROUTKY, J. D.

APPS-4 (Analytical Photogrammetric Processing System-4) remote sensing applications guide [AD-A134977] p 8 N84-17676

PERRY, JOHN S.

The US global change research program: Early achievements and future directions p 36 N93-18864

PETERSON, GARY L.

Analysis of LARI sensor system [DE93-006334] p 37 N93-24977

PFISTERER, RICHARD N.

Analysis of LARI sensor system [DE93-006334] p 37 N93-24977

PHILLIPS, DONALD L.

Effects of global climate change on agroecosystems: Scope of work [PB90-120023] p 23 N90-18813

PILON, PAUL GILLES

Integrating satellite imagery into a geographic information system for monitoring the downstream impacts of dam construction on floodplain agriculture in Sokoto State, Nigeria p 15 N93-14823

PINTODEGARRIDO, JUAN CARLOS

Analysis and modelling of spatial data proposal of a system for CBERS [INPE-4911-PRE/1512] p 12 N90-21445

PISAREVSKIY, I. F.

Determining characteristics of optical radiation reflectors based on results of remote sensing p 8 N85-25358

PORCH, W. M.

Application of optical remote sensing to the study of surface fluxes related to cloud formation [DE93-003783] p 45 N93-25125

PORTNEY, PAUL R.

Assessing and managing the risks of climate change p 28 N92-10233

POSTUCHOW, J. R.

Technology needs of advanced Earth observation spacecraft [NASA-CR-3698] p 2 N84-17248

POULAIN, J.

Space imagery processing: Methods and applications at the I.G.N.-France p 19 N83-70161

POWER, M. A.

Program on Earth Observation Data Management Systems (EODMS) [NASA-CR-175990] p 19 N85-73372

Program on Earth Observation Data Management Systems (EODMS) [NASA-CR-175993] p 19 N85-73373

PRELL, W. L.

Sensitivity of climate models: Comparison of simulated and observed patterns for past climates [DE92-002820] p 30 N92-16503

PRICE, C.

Lightning, atmospheric electricity, and climate change [DE94-002003] p 46 N94-23471

PRINN, RONALD G.

The role of lidars in global change research p 31 N92-29235

R

RABIN, R.

Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments p 43 N84-34864

RAMANSWAMY, V.

Radiative forcing of climate p 33 N93-11094

RAYNER, S.

Global change research: Science and policy [DE93-015675] p 39 N94-16445

REAGAN, J. A.

Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon p 17 N94-20961

RECK, R.

National US public policy on global warming derived from optimization of energy use and environmental impact studies [DE94-004606] p 40 N94-32790

REED, ROBERT M.

Global climate change and NEPA (National Environmental Policy Act) analyses [DE90-003704] p 22 N90-15540

RENNE, D. S.

Atmospheric radiation measurement: A program for improving radiative forcing and feedback in general circulation models [DE92-014263] p 43 N93-70092

REYES, GEORGE

JPL activities on development of acousto-optic tunable filter imaging spectrometer p 5 N94-16696

REYNOLDS, J. F.

Modeling the response of plants and ecosystems to global change [DE91-017403] p 28 N91-32587

RIND, D.

The Greenhouse Effect: Projections of global climate change p 41 N88-70493

ROBERTODOSSANTOS, JOAO

Multisensor remote sensing data and GIS techniques for monitoring preservation areas: A case study [INPE-5317-PRE/1714] p 16 N94-14131

ROBERTSON, BILL

More sense for less cents: Cost effective servicing of remote sensing satellites p 50 N94-11572

RODHE, HENNING

Radiative forcing of climate p 33 N93-11094

ROGRON, B.

A comparative study of SAR data compression schemes p 49 N94-28259

ROLLER, N. E. G.

A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program [NASA-CR-179704] p 11 N86-32828

ROMANOFF, STEVEN

Traditional anthropology and geographical information systems in the collaborative study of Cassava in Africa p 52 N94-71237

ROSS, ROGARD T.

Selection of representative instruments for a global change technology architecture trade study p 5 N92-15467

Options in the global change fleet architecture provided by the presence of an EOS-A and -B p 3 N92-15472

ROWELL, LAWRENCE F.

Advanced technology needs for a global change science program: Perspective of the Langley Research Center [NASA-TM-4196] p 12 N91-14634

ROYSE, P. H.

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 2 [NASA-CR-175973] p 20 N85-73661

Program on Earth Observation Data Management Systems, preliminary needs analysis report [NASA-CR-175981] p 20 N85-73662

Program on Earth Observation Data Management Systems (EODMS). Preliminary needs analysis report, part 3 [NASA-CR-175991] p 20 N85-73664

RUEDY, R.

The Greenhouse Effect: Projections of global climate change p 41 N88-70493

RUSSELL, G.

The Greenhouse Effect: Projections of global climate change p 41 N88-70493

S

SALK, MARTHA S.

Global climate change and NEPA (National Environmental Policy Act) analyses [DE90-003704] p 22 N90-15540

SALOMONSON, V. V.

Characterizing user requirements for future land observing satellites [NASA-TM-83867] p 6 N82-17562

SANGHVI, M. K.

The dilemma of fossil fuel use and global climate change [DE91-007859] p 27 N91-19533

SANTER, B. D.

Ocean variability and its influence on the detectability of greenhouse warming signals [DE94-008670] p 48 N94-32881

- SARICKS, C. L.**
Global warming: Transportation and energy considerations, 1990
[PB91-118919] p 27 N91-20567
- SATHAYE, JAYANT**
Carbon emissions and sequestration in forests: Case studies from seven developing countries. Volume 2: Greenhouse gas emissions from deforestation in the Brazilian Amazon
[DE93-001526] p 34 N93-16092
- SCHARTEL, W. A.**
Technology needs of advanced Earth observation spacecraft
[NASA-CR-3698] p 2 N84-17248
- SCHIFFER, ROBERT A.**
The detection of climate change due to the enhanced greenhouse effect
[NASA-TM-107965] p 31 N92-31258
- SCHMIDT, NICHOLAS**
Remote sensing for urban planning
p 18 N94-32465
- SCHNETZLER, C. C.**
Characterizing user requirements for future land observing satellites
[NASA-TM-83867] p 6 N82-17562
- SEDJO, ROGER A.**
Climate and forests
p 28 N92-10234
- SELLMAN, A. N.**
A fuelwood plantation site selection procedure using geographic information system technology: A case study in support of the NASA Global Habitability Program
[NASA-CR-179704] p 11 N86-32828
- SEPAŃSKI, R. J.**
TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632
Trends 1991: A compendium of data on global change
[DE92-011733] p 32 N92-31907
- SEPAŃSKI, ROBERT J.**
Trends '91: A compendium of data on global change. Highlights
[DE93-003112] p 38 N93-25144
- SETTLE, M.**
NASA's land remote sensing plans for the 1980's
p 8 N85-23224
- SETZER, A.**
Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon
p 17 N94-20961
- SEVERIN, B. A. B.**
International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 1
[DE92-013652] p 33 N93-11232
International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 2
[DE92-013653] p 33 N93-11233
- SHAW, W. I.**
Application of optical remote sensing to the study of surface fluxes related to cloud formation
[DE93-003783] p 45 N93-25125
- SHELTON, G.**
A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872
- SHIMABUKURO, YOSIO EDEMIR**
Multisensor remote sensing data and GIS techniques for monitoring preservation areas: A case study
[INPE-5317-PRE/1714] p 16 N94-14131
- SHINE, KEITH**
Radiative forcing of climate
p 33 N93-11094
- SHIUE, JIM**
Microwave sensing technology issues related to a global change technology architecture trade study
p 14 N92-15468
- SIDDIQI, TOUFIC A.**
Responding to the threat of global warming: Options for the Pacific and Asia
[DE90-014756] p 24 N90-28918
- SIDORENKO, A. V.**
Earth sciences from space
p 6 N81-76526
- SIEVERS, ROBERT E.**
Chemistry of the atmosphere: Its impact on global change. CHEMRAWN 7: Perspectives and recommendations
[PB93-180644] p 48 N93-29670
- SIMPSON, JAMES J.**
Remote sensing and geographic information systems: Implications for Global Marine Fisheries
[PB93-149409] p 15 N93-24309
- SIRCAR, JAYANTA K.**
Development of a prototype spatial information processing system for hydrologic research
[NASA-CR-191224] p 14 N92-32590
- SLINEY, JACK**
More sense for less cents: Cost effective servicing of remote sensing satellites
p 50 N94-11572
- SLUTSKER, I.**
Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon
p 17 N94-20961
- SMITH, JOEL B.**
Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 1
[PB90-171588] p 24 N91-10394
Potential effects of global climate change on the United States. Appendix A: Water resources
[PB90-171968] p 24 N91-10395
Potential effects of global climate change on the United States. Appendix B: Sea level rise
[PB90-172628] p 24 N91-10396
Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 2
[PB90-171596] p 24 N91-10397
Potential effects of global climate change on the United States. Appendix D: Forests
[PB90-173238] p 24 N91-10398
Potential effects of global climate change on the United States. Appendix E: Aquatic resources
[PB90-172297] p 25 N91-10399
Potential effects of global climate change on the United States. Appendix F: Air quality
[PB90-172230] p 25 N91-10400
Potential effects of global climate change on the United States. Appendix G: Health
[PB90-173881] p 25 N91-10401
Potential effects of global climate change on the United States. Appendix H: Infrastructure
[PB90-172313] p 25 N91-10402
Potential effects of global climate change on the United States. Appendix I: Variability
[PB90-173899] p 25 N91-10403
Potential effects of global climate change on the United States. Appendix J: Policy
[PB90-173188] p 25 N91-10404
- SMITH, T.**
Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3
[NASA-CR-179769] p 11 N86-32863
- SMITH, TERENCE**
Remote sensing information sciences research group
[NASA-CR-183374] p 11 N89-14481
- SOLOMON, ALLEN M.**
Climate and forests
p 28 N92-10234
- SOUTH, DAVID W.**
Global climate change: A fossil energy perspective
[DE90-003770] p 23 N90-15541
- SOUTHWORTH, F.**
Global warming: Transportation and energy considerations, 1990
[PB91-118919] p 27 N91-20567
- SPENCER, ROY W.**
Global temperature variations
p 45 N93-20068
- SPIERING, BRUCE**
Commercial applications multispectral sensor system
p 16 N93-25615
- STAR, J. L.**
Remote Sensing Information Sciences Research Group, Santa Barbara Information Sciences Research Group, year 3
[NASA-CR-179769] p 11 N86-32863
- STAR, JEFFREY L.**
Remote sensing information sciences research group
[NASA-CR-183374] p 11 N89-14481
Remote sensing information sciences research group: Browse in the EOS era
[NASA-CR-184637] p 11 N89-22979
- STARKS, PATRICK J.**
Biophysical characterization and surface radiation balance
[NASA-CR-194659] p 39 N94-17762
- STARR, LOWELL**
Center for Mapping, Ohio State University
p 14 N92-23655
- STEIN, R.**
Program on stimulating operational private sector use of Earth observation satellite information
[E82-10131] p 7 N82-21660
- STEINBERG, MEYER**
Solving global environmental problems through technological innovation
[DE90-010018] p 25 N91-16446
- STOKES, G. M.**
Atmospheric radiation measurement: A program for improving radiative forcing and feedback in general circulation models
[DE92-014263] p 43 N93-70092
- STONE, P.**
The Greenhouse Effect: Projections of global climate change
p 41 N88-70493
- STOSS, F. W.**
TRENDS '90: A compendium of data on global change
[DE91-000587] p 25 N91-15632
Trends 1991: A compendium of data on global change
[DE92-011733] p 32 N92-31907
- STOSS, FREDERICK W.**
Trends '91: A compendium of data on global change. Highlights
[DE93-003112] p 38 N93-25144
- STREETS, D. G.**
US energy use: New technologies and policies in response to global warming
[DE90-002170] p 22 N90-14724
- STREETS, DAVID G.**
Responding to the threat of global warming: Options for the Pacific and Asia
[DE90-014756] p 24 N90-28918
- SUNDARA-RAJAN, A.**
Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments
p 43 N84-34864
- SUTTLES, JOHN T.**
Satellite orbit considerations for a global change technology architecture trade study
[NASA-TM-104081] p 44 N91-25557
Science requirements for a global change technology architecture trade study
[NASA-TM-104082] p 45 N91-25558
Science requirements for a global change technology initiative architecture trade study
p 29 N92-15465
Satellite orbit considerations for a global change technology architecture trade study
p 1 N92-15466
- SWISSLER, THOMAS J.**
Advanced technology needs for a global change science program: Perspective of the Langley Research Center
[NASA-TM-4196] p 12 N91-14634

T

TABACK, ISRAEL

- Satellite orbit considerations for a global change technology architecture trade study
[NASA-TM-104081] p 44 N91-25557
Satellite orbit considerations for a global change technology architecture trade study
p 1 N92-15466
Sunsynchronous low Earth orbit spacecraft concepts and technology requirements for global change monitoring
p 2 N92-15469

TAMARESI, J. S.

- Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry
[DE94-007846] p 40 N94-32817

TANRE, D.

- Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon
p 17 N94-20961

TATENO, SATOSHI

- NASDA's view of ground control in mission operations
p 4 N94-23835

THIBAUT, DAVID A.

- An assessment of information demands for remote sensing and Geographic Information System technologies
[PB89-159313] p 12 N89-27233

THOMAS, ROBERT H.

- Polar research from satellites
[NASA-CR-188025] p 43 N91-21640

THOMPSON, LESLIE L.

- Potential commercial uses of EOS remote sensing products
p 13 N91-24055

THOMSON, K. P. B.

- Conference on Using Next Generation Earth Observation Satellites: Summary handbook
p 7 N83-12508

TIMMERMAN, PETER

- The Human Dimensions of Global Change: An International Programme on Human Interactions with the Earth
p 42 N93-71957

TIRPAK, DENNIS A.

- Policy options for stabilizing global climate. Volume 1: Chapters 1-6
[PB90-182304] p 23 N90-28146
Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 1
[PB90-171588] p 24 N91-10394
Potential effects of global climate change on the United States. Appendix A: Water resources
[PB90-171968] p 24 N91-10395
Potential effects of global climate change on the United States. Appendix B: Sea level rise
[PB90-172628] p 24 N91-10396
Potential effects of global climate change on the United States. Appendix C: Agriculture, volume 2
[PB90-171596] p 24 N91-10397

- Potential effects of global climate change on the United States. Appendix D: Forests
[PB90-173238] p 24 N91-10398
- Potential effects of global climate change on the United States. Appendix E: Aquatic resources
[PB90-172297] p 25 N91-10399
- Potential effects of global climate change on the United States. Appendix F: Air quality
[PB90-172230] p 25 N91-10400
- Potential effects of global climate change on the United States. Appendix G: Health
[PB90-173881] p 25 N91-10401
- Potential effects of global climate change on the United States. Appendix H: Infrastructure
[PB90-172313] p 25 N91-10402
- Potential effects of global climate change on the United States. Appendix I: Variability
[PB90-173899] p 25 N91-10403
- Potential effects of global climate change on the United States. Appendix J: Policy
[PB90-173188] p 25 N91-10404
- TOPPING, JOHN C., JR.**
Climate change and stratospheric ozone depletion: Need for more than the current minimalist response
p 41 N88-70502
- TRUPIN, ANDREW SETH**
The effect of global change and long period tides on the Earth's rotation and gravitational potential
p 14 N92-26781
- TRUPPI, LAWRENCE**
General circulation model output for forest climate change research and applications
[PB93-124626] p 37 N93-24015
- TURNER, D. P.**
Equilibrium-analysis of projected climate change effects on the global soil organic matter pool
[PB92-153022] p 31 N92-26509
- TURNER, MONICA G.**
Potential responses of landscape boundaries to global environmental change
[DE90-008568] p 26 N91-16451
- U**
- UNNINAYAR, SUSHEL**
The detection of climate change due to the enhanced greenhouse effect
[NASA-TM-107965] p 31 N92-31258
- V**
- VEGAS, P. L.**
A detailed procedure for the use of small scale photography in land use classification
[NASA-CR-176668] p 20 N86-71872
- VELTON, E. H.**
The ESA remote sensing satellite system (ERS-1)
p 8 N85-20777
- VENKATACHALAM, P.**
Geographic information system and its applications
p 14 N92-30915
- VERGARA, OSCAR RICARDO**
Updating topographic maps using orbital images in a microcomputer environment
[INPE-5409-PRE/1756] p 15 N93-19739
- VERMOTE, E.**
Sunphotometer network for monitoring aerosol properties in the Brazilian Amazon
p 17 N94-20961
- VEIRAMONTEIRO, ANTONIO MIGUEL**
Satellite image processing using symbolic structures of reduced vision conditions
[INPE-4638-TDL/337] p 49 N89-27367
- VINOGRADOV, B. V.**
Methods for complex space experiment in USSR for studying land from manned spacecraft
p 9 N86-14181
- VITOUSEK, PETER**
Global change and carrying capacity: Implications for life on Earth
p 26 N91-17454
- W**
- WALTER-SHEA, ELIZABETH A.**
Biophysical characterization and surface radiation balance
[NASA-CR-194659] p 39 N94-17762
- WANE, OUMAR**
Report of the Francophone African Workshop on the Human Dimensions of Global Change
[HDGCP-FA-001] p 41 N93-71749
- WANG, WEI-CHYUNG**
Radiative forcing of climate
p 33 N93-11094

- WARING, R. H.**
Driving terrestrial ecosystem models from space
p 39 N94-15896
- WATTS, E. C.**
Limiting net greenhouse gas emissions in the United States
[DE92-007267] p 30 N92-25313
- WAY, JO BEA**
Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data
p 51 N93-25798
- WAY, JOBEA**
Geographic information system for fusion and analysis of high-resolution remote sensing and ground truth data
p 52 N93-29234
- EOS SAR: A new approach
p 4 N94-15904
- WEBB, T. III**
Sensitivity of climate models: Comparison of simulated and observed patterns for past climates
[DE92-002820] p 30 N92-16503
- WEBER, N. V.**
Determination of the utility of remote sensing data for land use/cover analysis in the lower Appalachia region: Assessing the utility of remote sensing data for archeological site recognition
[E86-10021] p 10 N86-17815
- WEEKS, W. F.**
Spaceborne SAR and sea ice
p 4 N84-16412
- WEINSTEIN, R. H.**
Status and outlook for NASA's Land Remote Sensing Program
p 7 N83-17988
- WELLER, G.**
International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 1
[DE92-013652] p 33 N93-11232
- International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 2
[DE92-013653] p 33 N93-11233
- WELLER, GUNTHER**
Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 1
[AD-A253027] p 32 N92-33578
- Proceedings of International Conference on the Role of the Polar Regions in Global Change, volume 2
[AD-A253028] p 33 N92-33579
- WERNER, MARIAN U.**
X-SAR: The X-band synthetic aperture radar on board the Space Shuttle
p 4 N94-15891
- WHITMORE, ROY A., JR.**
Practical applications of remote sensing technology
[NASA-CR-186810] p 12 N90-26377
- WILLIAMS, E. R.**
Limiting net greenhouse gas emissions in the United States
[DE92-007267] p 30 N92-25313
- WILLIAMS, R. S., JR.**
Process thresholds: Report of Working Group Number 3
p 9 N85-32384
- WILSON, C. L.**
International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 1
[DE92-013652] p 33 N93-11232
- International Conference on the Role of the Polar Regions in Global Change: Proceedings, volume 2
[DE92-013653] p 33 N93-11233
- WITT, R. G.**
Second Eastern Regional Remote Sensing Applications Conference
[E83-10189] p 7 N83-19141
- WOO, KEN**
Microwave sensing technology issues related to a global change technology architecture trade study
p 14 N92-15468
- WOODWARD, W. A.**
Statistical examination of climatological data relevant to global temperature variation
[DE91-007881] p 27 N91-19540
- WOOLLEY, STAN**
Remote sensing and the Mississippi high accuracy reference network
p 19 N94-32466
- WORREST, ROBERT C.**
Scientific linkages in global change
[PB90-112608] p 23 N90-16356
- WRIGHT, ROBERT L.**
Global change technology architecture trade study
[NASA-TM-104128] p 29 N92-15464
- WUEBBLES, D. J.**
Sensitivity of global warming potentials to the assumed background atmosphere
[DE92-011072] p 31 N92-27417
- Sensitivity of direct global warming potentials to key uncertainties
[DE92-041045] p 35 N93-16296
- Quantified estimates of total GWPs for greenhouse gases taking into account tropospheric chemistry
[DE94-007846] p 40 N94-32817

- WUEBBLES, DONALD J.**
Radiative forcing of climate
p 33 N93-11094

Y

- YEGOROV, V. V.**
Tenth Conference of Working Group of Socialist Countries on Remote Sensing of Earth under Intercoms Program
p 9 N85-26820
- YUHAS, ROBERTA H.**
Discrimination among semi-arid landscape endmembers using the Spectral Angle Mapper (SAM) algorithm
p 17 N94-16711

Z

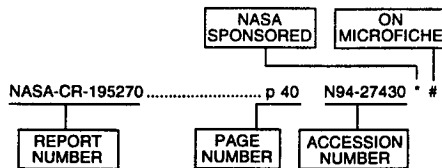
- ZIMMERMAN, M. B.**
The uses and limits of economic models as a climate change policy tool
[DE92-015792] p 34 N93-12474
- ZRNIC, S.**
Analysis of lidar, radar and satellite measurements on severe thunderstorms and their environments
p 43 N84-34864

REPORT NUMBER INDEX

REMOTE SENSING / GLOBAL CHANGE / A Special Bibliography

November 1994

Typical Report Number Index Listing



Listings in this index are arranged alphanumerically by report number. The page number indicates the page on which the citation is located. The accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

AD-A134977	p 8	N84-17676	#
AD-A231165	p 50	N91-21973	#
AD-A231166	p 13	N91-21623	#
AD-A247279	p 34	N93-11466	#
AD-A247855	p 3	N92-27388	#
AD-A253027	p 32	N92-33578	#
AD-A253028	p 33	N92-33579	#
AD-A255181	p 52	N93-12380	#
AD-A260762	p 38	N93-25837	#
AD-A273895	p 18	N94-25656	#
AD-A277077	p 5	N92-29228	* #
AID-PN-AAZ-554	p 12	N89-27233	#
AID-PN-ABM-278	p 48	N93-29670	#
ANL/EAIS/TM-17	p 24	N90-28918	#
ANL/ER/CP-81397	p 40	N94-32790	#
ARO-27859.1-GS-CF-VOL-1	p 32	N92-33578	#
ARO-27859.2-GS-CF-VOL-2	p 33	N92-33579	#
B-237780	p 30	N92-20647	#
B-240222	p 31	N92-25415	#
BNL-44417	p 25	N91-16446	#
CONF-8510284-1	p 44	N86-31190	#
CONF-8906244-1	p 22	N90-14724	#
CONF-8906244	p 24	N90-28918	#
CONF-891080-1	p 23	N90-15541	#
CONF-891098-4	p 22	N90-15540	#
CONF-891210-2	p 23	N90-16364	#
CONF-9002113-1	p 25	N91-16446	#
CONF-9006128-VOL-1	p 33	N93-11232	#
CONF-9006128-VOL-2	p 33	N93-11233	#
CONF-900775-1	p 26	N91-16451	#
CONF-9011154-1	p 26	N91-18492	#
CONF-910143-6	p 43	N93-70092	#
CONF-9102177-SUMM	p 34	N93-12474	#
CONF-9103221-SUMM	p 30	N92-24671	#
CONF-910402-7	p 27	N91-19533	#
CONF-9106396-1	p 35	N93-17209	#
CONF-9111335-ABSTS	p 47	N94-72025	#
CONF-9205167-1	p 32	N92-31896	#
CONF-920771-5	p 34	N93-12927	#
CONF-9210198-1	p 37	N93-22972	#
CONF-930244-2	p 38	N93-30009	#
CONF-930346-1	p 45	N93-25125	#
CONF-9305219-1	p 39	N94-16445	#
CONF-930656-1	p 39	N94-19930	#
CONF-9310249-1	p 40	N94-32790	#
CONF-940139-1	p 46	N94-23471	#

CSM-R-84/86	p 44	N91-17504	#
DE86-005154	p 44	N86-31190	#
DE87-005034	p 21	N87-22313	#
DE90-000858	p 22	N90-14715	#
DE90-001791	p 22	N90-14723	#
DE90-002170	p 22	N90-14724	#
DE90-003704	p 22	N90-15540	#
DE90-003770	p 23	N90-15541	#
DE90-003936	p 23	N90-16364	#
DE90-008568	p 26	N91-16451	#
DE90-010018	p 25	N91-16446	#
DE90-014756	p 24	N90-28918	#
DE91-000587	p 25	N91-15632	#
DE91-005020	p 26	N91-18492	#
DE91-007458	p 27	N91-19537	#
DE91-007859	p 27	N91-19533	#
DE91-007881	p 27	N91-19540	#
DE91-017403	p 28	N91-32587	#
DE92-002820	p 30	N92-16503	#
DE92-003221	p 30	N92-24671	#
DE92-004303	p 41	N92-70346	#
DE92-007267	p 30	N92-25313	#
DE92-009513	p 41	N92-70838	#
DE92-011072	p 31	N92-27417	#
DE92-011733	p 32	N92-31907	#
DE92-013652	p 33	N93-11232	#
DE92-013653	p 33	N93-11233	#
DE92-014263	p 43	N93-70092	#
DE92-014798	p 32	N92-31896	#
DE92-015792	p 34	N93-12474	#
DE92-019616	p 34	N93-12927	#
DE92-040829	p 52	N93-12380	#
DE92-040874	p 35	N93-17209	#
DE92-041045	p 35	N93-16298	#
DE93-001526	p 34	N93-16092	#
DE93-002347	p 37	N93-22972	#
DE93-002859	p 35	N93-18405	#
DE93-003112	p 38	N93-25144	#
DE93-003783	p 45	N93-25125	#
DE93-004601	p 36	N93-19505	#
DE93-005777	p 38	N93-30009	#
DE93-006334	p 37	N93-24977	#
DE93-015241	p 39	N94-17289	#
DE93-015675	p 39	N94-16445	#
DE93-016206	p 38	N94-13079	#
DE93-040323	p 39	N94-19930	#
DE93-776427	p 38	N93-29672	#
DE94-002003	p 46	N94-23471	#
DE94-003150	p 40	N94-28473	#
DE94-004606	p 40	N94-32790	#
DE94-006637	p 47	N94-72025	#
DE94-007846	p 40	N94-32817	#
DE94-008670	p 48	N94-32881	#
DE94-011465	p 47	N94-36244	#
DE94-757291	p 40	N94-32920	#
DOC-83SDS4223	p 7	N83-35466	* #
DOE/ER-0425	p 22	N90-14723	#
DOE/ER-0565T	p 35	N93-18405	#
DOE/ER-0597T	p 40	N94-28473	#
DOE/ER-60277/T1	p 21	N87-22313	#
DOE/ER-60304/6	p 30	N92-16503	#
DOE/ER-60490/T1	p 28	N91-32587	#
DOE/ER-60574/T1	p 41	N92-70346	* #
DOE/ER-61014/3	p 38	N94-13079	#
DOE/ER-61015/1	p 27	N91-19540	#
DOE/ER-61019/1	p 27	N91-19537	#
DOE/ER-61019/3	p 36	N93-19505	#
DOE/PE-0101	p 30	N92-25313	#
EPA/AA/CTAB-89/08	p 23	N90-28142	#
EPA/230/05-89/051-APP-A	p 24	N91-10395	#
EPA/230/05-89/052-APP-B	p 24	N91-10396	#
EPA/230/05-89/053-APP-C-VOL-1	p 24	N91-10394	#
EPA/230/05-89/053-APP-C-VOL-2	p 24	N91-10397	#
EPA/230/05-89/054-APP-D	p 24	N91-10398	#
EPA/230/05-89/055-APP-E	p 25	N91-10399	#
EPA/230/05-89/056-APP-F	p 25	N91-10400	#
EPA/230/05-89/057-APP-G	p 25	N91-10401	#

EPA/230/05-89/058-APP-H	p 25	N91-10402	#
EPA/230/05-89/059-APP-I	p 25	N91-10403	#
EPA/230/05-89/060-APP-J	p 25	N91-10404	#
EPA/600/A-92/039	p 31	N92-26509	#
EPA/600/D-89/126	p 23	N90-16356	#
EPA/600/R-92/194A	p 37	N93-24334	#
EPA/600/R-92/194B	p 37	N93-24645	#
EPA/600/R-92/217	p 37	N93-24015	#
EPA/600/3-89/068-VOL-1/2	p 22	N90-12981	#
EPA/600/3-89/076	p 23	N90-18813	#
EPA/600/8-91/216	p 30	N92-21439	#
ERIM-173900-2-F	p 11	N86-32828	* #
ERL-031	p 20	N86-71872	*
ESD-3746	p 32	N92-31907	#
ESDP-4129	p 47	N94-36244	#
ETL-R-152	p 50	N91-21973	#
ETL-R-153	p 13	N91-21623	#
ETL-0333	p 8	N84-17676	#
E82-10131	p 7	N82-21660	* #
E83-10189	p 7	N83-19141	* #
E86-10021	p 10	N86-17815	* #
FSGTR-SE-79	p 38	N93-27410	#
GAO/RCED-90-58	p 31	N92-25415	#
GAO/RCED-90-74BR	p 30	N92-20647	#
GORMP-18-VOL-2	p 29	N92-15457	* #
GPO-35-265	p 6	N82-15497	#
GPO-38-022	p 26	N91-19528	#
GPO-49-336	p 10	N86-16696	#
GPO-87-070	p 7	N82-22630	#
HDGCP-FA-001	p 41	N93-71749	#
IEE-SR-248	p 40	N94-32920	#
INPE-3313-PRE/620	p 5	N85-19385	#
INPE-4638-TDL/337	p 49	N89-27367	#
INPE-4911-PRE/1512	p 12	N90-21445	#
INPE-5203-PRE/1665	p 2	N91-21216	#
INPE-5317-PRE/1714	p 16	N94-14131	#
INPE-5358-NTC/301	p 51	N92-32227	#
INPE-5409-PRE/1756	p 15	N93-19739	#
INPE-5444-TDI/490	p 46	N94-13614	#
INPE-5477-TAE/019	p 16	N94-11524	#
ISBN-0-309-04089-2	p 26	N91-17453	#
ISBN-0-309-04328-X	p 26	N91-17457	#
ISBN-0-309-05017-0	p 27	N91-20567	#
ISBN-90-5271-009-0	p 51	N93-11789	#
JPL-PUB-83-51	p 21	N84-16656	* #
JPL-9950-858	p 7	N83-35466	* #
JSR-91-315	p 52	N93-12380	#
JSR-91-330A	p 3	N92-27388	#
JSR-91-330	p 38	N93-25837	#
JTN-88-80013	p 20	N90-70417	#
L-16705	p 12	N91-14634	* #
L-17126-PT-1	p 5	N92-29228	* #
LA-SUB-93-4	p 37	N93-24977	#
LA-UR-92-3500	p 45	N93-25125	#
LARS-CR-012391	p 12	N91-17438	* #
LBL-30797-VOL-1	p 39	N94-17289	#
LBL-32758-VOL-2	p 34	N93-16092	#
LC-89-62950	p 26	N91-17453	#

REPORT

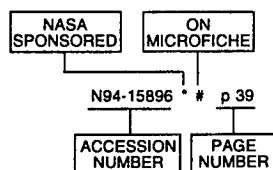
LC-90-44171	p 27	N91-20567	#	NASA-CR-175993	p 19	N85-73373	*	PB89-163265	p 12	N89-27232	#
LC-90-62105	p 26	N91-17457	#	NASA-CR-176435	p 10	N86-17815	*	PB89-224943	p 22	N90-12981	#
M-704	p 45	N93-20067	*	NASA-CR-176519	p 42	N86-20992	*	PB89-231344	p 21	N90-12980	*
MCR-81-630	p 2	N84-17248	*	NASA-CR-176668	p 20	N86-71872	*	PB90-112608	p 23	N90-16356	#
NAS 1.15:101135	p 21	N88-27650	*	NASA-CR-176796	p 10	N86-25873	*	PB90-120023	p 23	N90-18813	#
NAS 1.15:101186	p 6	N89-22969	*	NASA-CR-177294	p 10	N86-26669	*	PB90-161688	p 23	N90-28142	#
NAS 1.15:101849	p 20	N90-70833	*	NASA-CR-179704	p 11	N86-32828	*	PB90-171588	p 24	N91-10394	#
NAS 1.15:102942	p 20	N91-70662	*	NASA-CR-179769	p 11	N86-32863	*	PB90-171596	p 24	N91-10397	#
NAS 1.15:104081	p 44	N91-25557	*	NASA-CR-183374	p 11	N89-14481	*	PB90-171968	p 24	N91-10395	#
NAS 1.15:104082	p 45	N91-25558	*	NASA-CR-183487	p 29	N92-14490	*	PB90-172230	p 25	N91-10400	#
NAS 1.15:104126	p 29	N92-15464	*	NASA-CR-184637	p 11	N89-22979	*	PB90-172297	p 25	N91-10399	#
NAS 1.15:104985	p 6	N91-24669	*	NASA-CR-185873	p 21	N90-12980	*	PB90-172313	p 25	N91-10402	#
NAS 1.15:105119	p 29	N92-15457	*	NASA-CR-186810	p 12	N90-26377	*	PB90-172628	p 24	N91-10396	#
NAS 1.15:105121	p 47	N91-11603	*	NASA-CR-187916	p 12	N91-17438	*	PB90-173188	p 25	N91-10404	#
NAS 1.15:105137	p 13	N91-30592	*	NASA-CR-188025	p 43	N91-21640	*	PB90-173238	p 25	N91-10398	#
NAS 1.15:107965	p 31	N92-31258	*	NASA-CR-188038	p 27	N91-22619	*	PB90-173881	p 25	N91-10401	#
NAS 1.15:107994	p 33	N92-34028	*	NASA-CR-188238	p 13	N91-24671	*	PB90-173899	p 25	N91-10403	#
NAS 1.15:108012	p 1	N93-11528	*	NASA-CR-190167	p 41	N92-70346	*	PB90-182304	p 23	N90-28146	#
NAS 1.15:108252	p 4	N94-14112	*	NASA-CR-190675	p 32	N92-31259	*	PB90-202623	p 24	N90-28907	#
NAS 1.15:108253	p 3	N94-10699	*	NASA-CR-190954	p 45	N93-11880	*	PB91-118919	p 27	N91-20567	#
NAS 1.15:108983	p 36	N93-19940	*	NASA-CR-191208	p 51	N93-12680	*	PB91-145813	p 28	N91-24687	#
NAS 1.15:109214	p 20	N94-70142	*	NASA-CR-191224	p 51	N93-12660	*	PB92-122803	p 30	N92-21439	#
NAS 1.15:109395	p 49	N94-71223	*	NASA-CR-191691	p 14	N92-32590	*	PB92-153022	p 31	N92-26509	#
NAS 1.15:109847	p 19	N94-34018	*	NASA-CR-193279	p 41	N93-71155	*	PB92-156892	p 32	N92-31620	#
NAS 1.15:4196	p 12	N91-14634	*	NASA-CR-194659	p 39	N94-17762	*	PB92-207125	p 51	N93-11789	#
NAS 1.15:85009	p 50	N85-28877	*	NASA-CR-195227	p 18	N94-26236	*	PB92-224682	p 36	N93-21211	#
NAS 1.15:85557	p 50	N84-20434	*	NASA-CR-195270	p 40	N94-27430	*	PB93-101244	p 37	N93-21696	#
NAS 1.15:86129-VOL-1-PT-1	p 5	N84-30450	*	NASA-CR-196133	p 40	N94-35503	*	PB93-101293	p 36	N93-21695	#
NAS 1.15:87777	p 6	N86-31094	*	NASA-CR-3698	p 2	N84-17248	*	PB93-117927	p 43	N93-21686	#
NAS 1.15:89702	p 11	N88-15283	*	NASA-CR-4313	p 44	N90-28310	*	PB93-124626	p 37	N93-24015	#
NAS 1.15:89709	p 11	N88-18046	*	NASA-SP-7092	p 13	N91-30588	*	PB93-146082	p 37	N93-24334	#
NAS 1.21:7092	p 13	N91-30588	*	NASA-SP-7102	p 15	N93-23239	*	PB93-146090	p 37	N93-24645	#
NAS 1.21:7102	p 15	N93-23239	*	NASA-TM-101135	p 21	N88-27650	*	PB93-149409	p 15	N93-24309	#
NAS 1.26:168515	p 7	N82-21660	*	NASA-TM-101186	p 6	N89-22969	*	PB93-176246	p 38	N93-27410	#
NAS 1.26:173109	p 7	N83-35466	*	NASA-TM-101849	p 20	N90-70833	*	PB93-180644	p 48	N93-29670	#
NAS 1.26:173210	p 21	N84-16656	*	NASA-TM-102942	p 20	N91-70662	*	PB93-192920	p 17	N94-21446	#
NAS 1.26:173790	p 19	N84-74962	*	NASA-TM-102942	p 44	N91-25557	*	PB94-126992	p 18	N94-31068	#
NAS 1.26:175204	p 48	N84-20154	*	NASA-TM-104081	p 45	N91-25558	*	PB94-138120	p 18	N94-29107	#
NAS 1.26:175269	p 2	N85-15774	*	NASA-TM-104128	p 45	N91-25558	*	PCMDI-14	p 48	N94-32881	#
NAS 1.26:175944	p 43	N85-73230	*	NASA-TM-104985	p 29	N92-15464	*	PNL-SA-18559	p 43	N93-70092	#
NAS 1.26:175973	p 20	N85-73661	*	NASA-TM-105119	p 6	N91-24669	*	PNL-SA-22390	p 39	N94-16445	#
NAS 1.26:175981	p 20	N85-73662	*	NASA-TM-105121	p 29	N92-15457	*	PNL-SA-22711	p 39	N94-19930	#
NAS 1.26:175990	p 19	N85-73372	*	NASA-TM-105137	p 47	N92-11603	*	RAL-93-095	p 18	N94-29107	#
NAS 1.26:175991	p 20	N85-73664	*	NASA-TM-105121	p 13	N91-30592	*	REPT-901-0081	p 8	N84-17676	#
NAS 1.26:175993	p 19	N85-73373	*	NASA-TM-107965	p 31	N92-31258	*	S-HRG-101-1160	p 26	N91-19528	#
NAS 1.26:176435	p 10	N86-17815	*	NASA-TM-107979	p 33	N92-34028	*	SAND-89-1338C	p 23	N90-16364	#
NAS 1.26:176519	p 42	N86-20992	*	NASA-TM-108012	p 1	N93-11528	*	SE-47	p 43	N93-21686	#
NAS 1.26:176668	p 20	N86-71872	*	NASA-TM-108252	p 4	N94-14112	*	SE-48	p 36	N93-21211	#
NAS 1.26:176796	p 10	N86-25873	*	NASA-TM-108253	p 3	N94-10699	*	T-CSGCP-025	p 15	N93-24309	#
NAS 1.26:177294	p 10	N86-26669	*	NASA-TM-108983	p 36	N93-19940	*	TABES PAPER 92-447	p 32	N92-32014	#
NAS 1.26:179704	p 11	N86-32828	*	NASA-TM-109214	p 20	N94-70142	*	TEC-R-198	p 18	N94-25656	#
NAS 1.26:179769	p 11	N86-32863	*	NASA-TM-109395	p 49	N94-71223	*	TEC-SR-1	p 34	N93-11466	#
NAS 1.26:183374	p 11	N89-14481	*	NASA-TM-109634	p 16	N94-15245	*	TRB/TRR-1267	p 27	N91-20567	#
NAS 1.26:183487	p 29	N92-14490	*	NASA-TM-109806	p 19	N94-33598	*	UCID-21769	p 22	N90-14715	#
NAS 1.26:184637	p 11	N89-22979	*	NASA-TM-109847	p 19	N94-34018	*	UCRL-CR-107791	p 41	N92-70838	#
NAS 1.26:185873	p 21	N90-12980	*	NASA-TM-4196	p 12	N91-14634	*	UCRL-ID-109847	p 31	N92-27417	#
NAS 1.26:186810	p 12	N90-26377	*	NASA-TM-83867	p 6	N82-17562	*	UCRL-ID-111461	p 35	N93-16298	#
NAS 1.26:187916	p 12	N91-17438	*	NASA-TM-85009	p 50	N85-28877	*	UCRL-ID-115329	p 48	N94-32881	#
NAS 1.26:188025	p 43	N91-21640	*	NASA-TM-85557	p 50	N84-20434	*	UCRL-ID-115850	p 40	N94-32817	#
NAS 1.26:188038	p 27	N91-22619	*	NASA-TM-86129-VOL-1-PT-1	p 5	N84-30450	*	UCRL-JC-108957	p 34	N93-12927	#
NAS 1.26:188238	p 13	N91-24671	*	NASA-TM-87777	p 6	N86-31094	*	UCRL-JC-115035	p 46	N94-23471	#
NAS 1.26:190167	p 41	N92-70346	*	NASA-TM-89702	p 11	N88-15283	*	USGS-CIRC-865	p 42	N83-11639	#
NAS 1.26:190675	p 32	N92-31259	*	NASA-TM-89709	p 11	N88-18046	*	USGS-OFR-85-304	p 11	N86-26675	#
NAS 1.26:190954	p 45	N93-11880	*	NASDA-CP-03-8	p 20	N90-70417	*				
NAS 1.26:191208	p 51	N93-12680	*	NEDO-ITE-9108	p 38	N93-29672	#				
NAS 1.26:191217	p 51	N93-12660	*	NOAA-NERDIS-89/05-VOL-1	p 12	N89-27231	#				
NAS 1.26:191224	p 14	N92-32590	*	NOAA-NESDIS-89/06-VOL-2	p 12	N89-27232	#				
NAS 1.26:191691	p 41	N93-71155	*	NONP-NASA-VT-93-190432	p 16	N94-15245	*				
NAS 1.26:193279	p 20	N93-72477	*	NONP-NASA-VT-94-12934	p 19	N94-33598	*				
NAS 1.26:194659	p 39	N94-17762	*	NONP-NASA-VT-94-15911	p 40	N94-35503	*				
NAS 1.26:195227	p 18	N94-26236	*	NSF-91-33	p 35	N93-18319	#				
NAS 1.26:195270	p 40	N94-27430	*	NSF-92-77	p 35	N93-18319	#				
NAS 1.26:3698	p 2	N84-17248	*	NSSDC/WDC-A-R/S-91-34	p 33	N92-34028	*				
NAS 1.26:4313	p 44	N90-28310	*	ORNL/CDIAC-36	p 25	N91-15632	#				
NAS 1.55:2198	p 7	N83-19141	*	ORNL/CDIAC-46	p 32	N92-31907	#				
NAS 1.55:3158-PT-1	p 5	N92-29228	*	ORNL/CDIAC-49	p 38	N93-25144	#				
NAS 1.55:3184	p 45	N93-20067	*	ORNL/CDIAC-64	p 47	N94-36244	#				
NASA-CP-2198	p 7	N83-19141	*	OTA-BP-ISC-122	p 18	N94-31068	#				
NASA-CP-3158-PT-1	p 5	N92-29228	*	PB84-161769	p 42	N84-24038	#				
NASA-CP-3184	p 45	N93-20067	*	PB86-152923	p 10	N86-25873	*				
NASA-CR-168515	p 7	N82-21660	*	PB86-166097	p 11	N86-26675	#				
NASA-CR-173109	p 7	N83-35466	*	PB88-142393	p 21	N88-19021	#				
NASA-CR-173210	p 21	N84-16656	*	PB89-159313	p 12	N89-27233	#				
NASA-CR-173790	p 19	N84-74962	*	PB89-163257	p 12	N89-27231	#				
NASA-CR-175204	p 48	N84-20154	*								
NASA-CR-175269	p 2	N85-15774	*								
NASA-CR-175944	p 43	N85-73230	*								
NASA-CR-175973	p 20	N85-73661	*								
NASA-CR-175981	p 20	N85-73662	*								
NASA-CR-175990	p 19	N85-73372	*								
NASA-CR-175991	p 20	N85-73664	*								

ACCESSION NUMBER INDEX

REMOTE SENSING / GLOBAL CHANGE / A Special Bibliography

November 1994

Typical Accession Number Index Listing



Listings in this index are arranged alphanumerically by accession number. The page number indicates the page on which the citation is located. The accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

N81-76526	#	p 6	N86-26675	#	p 11	N91-14634	#	p 12	N92-33578	#	p 32	N94-23868	#	p 50
N82-15497	#	p 6	N86-31094	#	p 6	N91-15632	#	p 25	N92-33579	#	p 33	N94-24357	#	p 17
N82-17562	#	p 6	N86-31190	#	p 44	N91-16446	#	p 25	N92-34028	#	p 33	N94-25656	#	p 18
N82-21660	#	p 7	N86-32828	#	p 11	N91-16451	#	p 26	N92-70346	#	p 41	N94-26236	#	p 18
N82-22630	#	p 7	N86-32863	#	p 11	N91-17438	#	p 12	N92-70838	#	p 41	N94-27430	#	p 40
N83-10471	#	p 7	N86-71872	#	p 20	N91-17453	#	p 26	N93-11094	#	p 33	N94-28259	#	p 49
N83-11639	#	p 42	N87-22313	#	p 21	N91-17454	#	p 26	N93-11232	#	p 33	N94-28473	#	p 40
N83-12508	#	p 7	N88-15283	#	p 11	N91-17457	#	p 26	N93-11233	#	p 33	N94-29107	#	p 18
N83-17988	#	p 7	N88-18046	#	p 11	N91-17504	#	p 44	N93-11466	#	p 34	N94-31068	#	p 18
N83-19141	#	p 7	N88-19021	#	p 21	N91-18492	#	p 26	N93-11528	#	p 1	N94-32465	#	p 18
N83-35466	#	p 7	N88-24038	#	p 52	N91-19528	#	p 26	N93-11789	#	p 51	N94-32466	#	p 19
N83-70161	#	p 19	N88-27650	#	p 21	N91-19533	#	p 27	N93-11880	#	p 45	N94-32790	#	p 40
N84-16412	#	p 4	N88-70493	#	p 41	N91-19537	#	p 27	N93-12380	#	p 52	N94-32817	#	p 40
N84-16656	#	p 21	N88-70502	#	p 41	N91-19540	#	p 27	N93-12474	#	p 34	N94-32881	#	p 48
N84-17248	#	p 2	N89-11761	#	p 1	N91-20567	#	p 27	N93-12660	#	p 51	N94-32920	#	p 40
N84-17676	#	p 8	N89-11774	#	p 1	N91-21216	#	p 2	N93-12680	#	p 51	N94-33598	#	p 19
N84-18257	#	p 47	N89-14481	#	p 11	N91-21623	#	p 13	N93-12927	#	p 34	N94-34018	#	p 19
N84-20154	#	p 48	N89-22969	#	p 6	N91-21623	#	p 13	N93-14823	#	p 15	N94-35503	#	p 40
N84-20434	#	p 50	N89-22979	#	p 11	N91-21640	#	p 43	N93-16092	#	p 34	N94-36244	#	p 47
N84-24038	#	p 42	N89-27231	#	p 12	N91-21973	#	p 50	N93-16298	#	p 35	N94-36987	#	p 40
N84-30450	#	p 5	N89-27232	#	p 12	N91-22619	#	p 27	N93-17209	#	p 35	N94-70142	#	p 20
N84-30453	#	p 6	N89-27233	#	p 12	N91-22622	#	p 27	N93-18319	#	p 35	N94-71223	#	p 49
N84-31238	#	p 8	N89-27367	#	p 49	N91-22623	#	p 28	N93-18405	#	p 35	N94-71229	#	p 21
N84-34864	#	p 43	N90-12980	#	p 21	N91-23733	#	p 49	N93-18864	#	p 36	N94-71231	#	p 42
N84-35050	#	p 8	N90-12981	#	p 22	N91-24055	#	p 13	N93-19505	#	p 36	N94-71237	#	p 52
N84-74448	#	p 19	N90-14715	#	p 22	N91-24669	#	p 6	N93-19739	#	p 15	N94-72025	#	p 47
N84-74962	#	p 19	N90-14723	#	p 22	N91-24671	#	p 13	N93-19940	#	p 36			
N85-15774	#	p 2	N90-14724	#	p 22	N91-24687	#	p 28	N93-20067	#	p 45			
N85-19385	#	p 5	N90-15540	#	p 22	N91-24690	#	p 28	N93-20068	#	p 45			
N85-20776	#	p 8	N90-15541	#	p 23	N91-25557	#	p 44	N93-21211	#	p 36			
N85-20777	#	p 8	N90-16356	#	p 23	N91-25558	#	p 45	N93-21686	#	p 43			
N85-23224	#	p 8	N90-16364	#	p 23	N91-27600	#	p 45	N93-21695	#	p 36			
N85-25358	#	p 8	N90-18813	#	p 23	N91-28079	#	p 2	N93-21696	#	p 37			
N85-26820	#	p 9	N90-21445	#	p 12	N91-30173	#	p 13	N93-22972	#	p 37			
N85-26834	#	p 1	N90-25447	#	p 44	N91-30588	#	p 13	N93-23239	#	p 15			
N85-28877	#	p 50	N90-26377	#	p 12	N91-30592	#	p 13	N93-24015	#	p 37			
N85-32384	#	p 9	N90-27155	#	p 42	N91-32587	#	p 28	N93-24309	#	p 15			
N85-33130	#	p 9	N90-28142	#	p 23	N91-70662	#	p 20	N93-24334	#	p 37			
N85-73230	#	p 43	N90-28310	#	p 44	N91-71330	#	p 41	N93-24645	#	p 37			
N85-73372	#	p 19	N90-28907	#	p 24	N91-71392	#	p 41	N93-24929	#	p 47			
N85-73373	#	p 19	N90-28918	#	p 24	N92-10232	#	p 28	N93-24977	#	p 37			
N85-73661	#	p 20	N90-70417	#	p 20	N92-10233	#	p 28	N93-25125	#	p 45			
N85-73662	#	p 20	N90-70833	#	p 20	N92-10234	#	p 28	N93-25144	#	p 38			
N85-73664	#	p 20	N91-10394	#	p 24	N92-10238	#	p 29	N93-25434	#	p 15			
N85-74434	#	p 47	N91-10395	#	p 24	N92-10240	#	p 29	N93-25615	#	p 16			
N86-14181	#	p 9	N91-10396	#	p 24	N92-11603	#	p 47	N93-25707	#	p 16			
N86-14184	#	p 9	N91-10397	#	p 24	N92-14490	#	p 29	N93-25798	#	p 51			
N86-16696	#	p 10	N91-10398	#	p 24	N92-15457	#	p 29	N93-25837	#	p 38			
N86-16856	#	p 47	N91-10399	#	p 25	N92-15464	#	p 29	N93-27410	#	p 38			
N86-17815	#	p 10	N91-10400	#	p 25	N92-15465	#	p 29	N93-29234	#	p 52			
N86-20260	#	p 10	N91-10401	#	p 25	N92-15466	#	p 1	N93-29670	#	p 48			
N86-20947	#	p 10	N91-10402	#	p 25	N92-15467	#	p 5	N93-29672	#	p 38			
N86-20992	#	p 42	N91-10403	#	p 25	N92-15468	#	p 14	N93-30009	#	p 38			
N86-25873	#	p 10	N91-10404	#	p 25	N92-15469	#	p 2	N93-70092	#	p 43			
N86-26669	#	p 10				N92-15470	#	p 3	N93-71155	#	p 41			
						N92-15471	#	p 3	N93-71749	#	p 41			
						N92-15472	#	p 3	N93-71957	#	p 42			
						N92-15473	#	p 51	N93-72477	#	p 20			
						N92-15474	#	p 29	N94-10699	#	p 3			
						N92-15475	#	p 5	N94-11524	#	p 16			
						N92-15476	#	p 14	N94-11572	#	p 50			
						N92-16009	#	p 3	N94-13079	#	p 38			
						N92-16503	#	p 30	N94-13614	#	p 46			
						N92-20647	#	p 30	N94-14112	#	p 4			
						N92-21439	#	p 30	N94-14131	#	p 16			
						N92-23655	#	p 14	N94-15245	#	p 16			
						N92-24671	#	p 30	N94-15891	#	p 4			
						N92-25313	#	p 30	N94-15896	#	p 39			
						N92-25415	#	p 31	N94-15904	#	p 4			
						N92-26509	#	p 31	N94-15914	#	p 17			
						N92-26781	#	p 14	N94-16445	#	p 39			
						N92-27388	#	p 3	N94-16696	#	p 5			
						N92-27417	#	p 31	N94-16711	#	p 17			
						N92-29228	#	p 5	N94-16760	#	p 48			
						N92-29235	#	p 31	N94-17289	#	p 39			
						N92-30915	#	p 14	N94-17762	#	p 39			
						N92-31258	#	p 31	N94-19930	#	p 39			
						N92-31259	#	p 32	N94-20961	#	p 17			
						N92-31620	#	p 32	N94-21446	#	p 17			
						N92-31896	#	p 32	N94-21641	#	p 46			
						N92-31907	#	p 32	N94-21642	#	p 46			
						N92-32014	#	p 32	N94-23471	#	p 46			
						N92-32227	#	p 51	N94-23835	#	p 4			
						N92-32590	#	p 14						

AVAILABILITY OF CITED PUBLICATIONS

OPEN LITERATURE ENTRIES (A94-60000 Series)

Inquiries and requests should be addressed to: CASI, 800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934. Orders are also taken by telephone, (301) 621-0390, e-mail, help@sti.nasa.gov, and fax, (301) 621-0134. Please refer to the accession number when requesting publications.

STAR ENTRIES (N94-10000 Series)

One or more sources from which a document announced in *STAR* is available to the public is ordinarily given on the last line of the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below, and their addresses are listed on page APP-3. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

Avail: CASI. Sold by the NASA Center for AeroSpace Information. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page APP-5.

NOTE ON ORDERING DOCUMENTS: When ordering publications from CASI, use the N accession number or other report number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: ESDU. Pricing information on specific data, computer programs, and details on Engineering Sciences Data Unit (ESDU) topic categories can be obtained from ESDU International Ltd. Requesters in North America should use the Virginia address while all other requesters should use the London address, both of which are on page APP-3.

Avail: Fachinformationszentrum Karlsruhe. Gesellschaft für wissenschaftlich-technische Information mbH 76344 Eggenstein-Leopoldshafen, Germany.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, CA. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration (JBD-4), Public Documents Room (Room 1H23), Washington, DC 20546-0001, or public document rooms located at NASA installations, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

- Avail: NTIS. Sold by the National Technical Information Service. Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) are available. For information concerning this service, consult the NTIS Subscription Section, Springfield, VA 22161.
- Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.
- Avail: US Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of \$1.50 each, postage free.
- Avail: (US Sales Only). These foreign documents are available to users within the United States from the National Technical Information Service (NTIS). They are available to users outside the United States through the International Nuclear Information Service (INIS) representative in their country, or by applying directly to the issuing organization.
- Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed on page APP-3. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

FEDERAL DEPOSITORY LIBRARY PROGRAM

In order to provide the general public with greater access to U.S. Government publications, Congress established the Federal Depository Library Program under the Government Printing Office (GPO), with 53 regional depositories responsible for permanent retention of material, inter-library loan, and reference services. At least one copy of nearly every NASA and NASA-sponsored publication, either in printed or microfiche format, is received and retained by the 53 regional depositories. A list of the regional GPO libraries, arranged alphabetically by state, appears on the inside back cover of this issue. These libraries are *not* sales outlets. A local library can contact a regional depository to help locate specific reports, or direct contact may be made by an individual.

PUBLIC COLLECTION OF NASA DOCUMENTS

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England for public access. The British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols # and * from ESA — Information Retrieval Service European Space Agency, 8-10 rue Mario-Nikis, 75738 CEDEX 15, France.

STANDING ORDER SUBSCRIPTIONS

NASA SP-7037 supplements and annual index are available from the NASA Center for AeroSpace Information (CASI) on standing order subscription. Standing order subscriptions do not terminate at the end of a year, as do regular subscriptions, but continue indefinitely unless specifically terminated by the subscriber.

ADDRESSES OF ORGANIZATIONS

British Library Lending Division
Boston Spa, Wetherby, Yorkshire
England

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, DC 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

European Space Agency-
Information Retrieval Service ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Engineering Sciences Data Unit International
P.O. Box 1633
Manassas, VA 22110

Engineering Sciences Data Unit
International, Ltd.
251-259 Regent Street
London, W1R 7AD, England

Fachinformationszentrum Karlsruhe
Gesellschaft für wissenschaftlich-technische
Information mbH
76344 Eggenstein-Leopoldshafen, Germany

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090-2934

National Aeronautics and Space Administration
Scientific and Technical Information Program
(JTT)
Washington, DC 20546-0001

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, CA 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, MI 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey Library National Center
MS 950
12201 Sunrise Valley Drive
Reston, VA 22092

U.S. Geological Survey Library
2255 North Gemini Drive
Flagstaff, AZ 86001

U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025

U.S. Geological Survey Library
Box 25046
Denver Federal Center, MS914
Denver, CO 80225

CASI PRICE TABLES

(Effective November 1, 1994)

STANDARD PRICE DOCUMENTS

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
A01	\$ 6.00	\$ 12.00
A02	9.00	18.00
A03	17.50	35.00
A04-A05	19.50	39.00
A06-A09	27.00	54.00
A10-A13	36.50	73.00
A14-A17	44.50	89.00
A18-A21	52.00	104.00
A22-A25	61.00	122.00
A99	Call For Price	Call For Price

MICROFICHE

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
A01	\$ 9.00	\$ 18.00
A02	12.50	25.00
A03	17.50	35.00
A04	19.50	39.00
A06	27.00	54.00
A10	36.50	73.00

IMPORTANT NOTICE

CASI Shipping and Handling Charges
U.S.—ADD \$3.00 per TOTAL ORDER
Canada and Mexico—ADD \$3.50 per TOTAL ORDER
All Other Countries—ADD \$7.50 per TOTAL ORDER
Does NOT apply to orders
requesting CASI RUSH HANDLING.
CASI accepts most credit/charge cards.

NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090-2934
Telephone: (301) 621-0390
E-mail: help@sti.nasa.gov
Fax: (301) 621-0134